PUBLIC WORKS

Aug. 1931

CITY, COUNTY AND STATE

y to Get It—The Pro-
rement Merry-Go-Round

ntrolling Odors in
San Antonio River

thods and Equipment
for Ice Control

nning and Building a
New Water Supply

ecial Sewage Treatment
Design for a Small City

building Fort Worth's
Old Trickling Filters

Marion E. Berlin is City Engineer of Chattanooga, Tenn., one of the most important industrial cities in the South. More data on page 22.

HUBER

...WORLD HEADQUARTERS FOR ROLLERS!

3-4 TON TANDEM

5-8 TON TANDEM

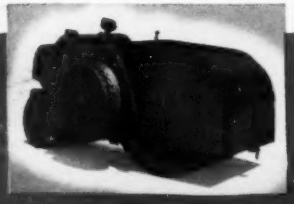
8-12 TON TANDEM

5-6 TON THREE WHEEL

8 TON THREE WHEEL

10-12 TON THREE WHEEL

TRENCH ROLLER



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COMPACTION ROLLER

You can look to HUBER as world headquarters for all roller problems. The HUBER line, backed up by 87 years of manufacturing experience, meets every roller requirement.

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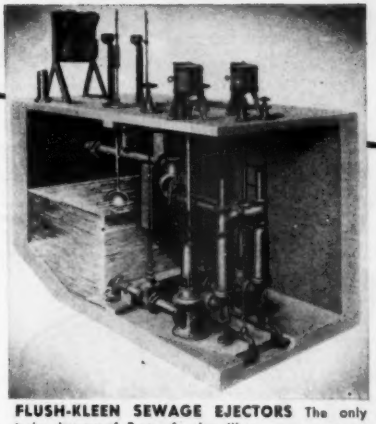
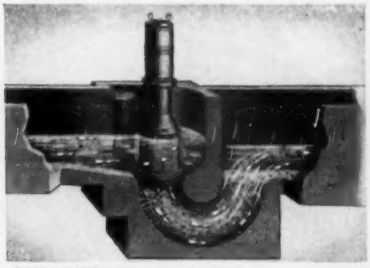
CHICAGO SEWAGE EQUIPMENT



FLUSH-KLEEN SEWAGE EJECTORS The only truly clog-proof Pump for handling raw sewage or any liquid containing coarse and stringy matter. Incoming sewage flows through the idle Pump. Incoming solids are retained on a screen. When the Pump starts the screen is back-washed and all solids are carried to the discharge pipe. The Pump handles only strained liquid.



COMMINUTORS The Comminutor automatically screens and cuts sewage solids without removal from the line of flow. No handling, burial, or incineration of screenings. Odors, unsightliness and fly nuisance eliminated.

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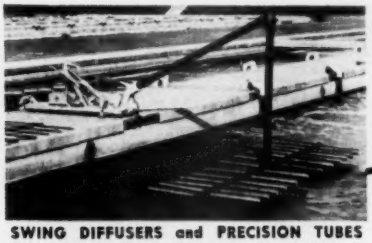

SWING DIFFUSERS and PRECISION TUBES Continuous operation of an aeration battery is possible only with Swing Diffusers. The most economical operation is possible with Precision Diffuser Tubes. No stand-by tanks for cleaning diffuser media and lower maximum blower pressures mean lower first cost and lower operating cost.

CHICAGO PUMP COMPANY

SEWAGE EQUIPMENT DIVISION

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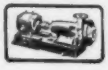

Flush Kleen, Screw-Feeder, Plunger, Horizontal and Vertical Non-Clogs Water Seal Pumping Units, Samplers, Swing Diffusers, Stationary Diffusers, Mechanical Aerators, Combination Aerator-Clarifiers, Comminutors.

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PUBLIC WORKS *Magazine*

Edited by W. A. Hardenbergh and A. Prescott Folwell

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THE ENGINEERING AUTHORITY IN THE CITY-COUNTY FIELD

Excavating to bring a street to grade, this T4 TRAXCAVATOR takes full cubic yard bites . . . spins and hauls in fifth gear . . . dumps quickly and accurately into the hauling unit . . . races back for another cost-cutting load. The T4 is owned by the City of Yorkton, Saskatchewan.

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THE EDITOR'S PAGE

Good Engineering is Needed More than Ever Before

AT THE price that we now pay for labor and materials, good engineering and good management are needed more than ever before. No community can afford to forget that the structures it builds are no better than the engineering design and the materials that go into them. Though this may apply with particular force to structures built as units, for example sewage treatment and water purification plants, and to underground structures, such as sewers and water lines, the statement is entirely true for every facility that a city, county or state constructs.

Good engineering should not and cannot stop at engineering alone. Other sciences must contribute—the chemist, the bacteriologist, the soil specialist, and others. Good engineering calls on these other sciences in accordance with the nature of the problem to be solved and utilizes their skills in producing better public works. Good engineering insures, also, the use of the best materials for the particular job to be done; and their proper incorporation into the work. In short, good engineering assures a community that the money it spends is well spent and will return full dividends for a long time in the future.

What Are the Essential Factors in Sewage Treatment?

COSTS being what they are to-day, it is time to weigh carefully every requirement that a State Board of Health imposes on the designer of a sewage treatment plant. The question should be: Is this requirement fully justified by reason of better quality of effluent, safer operation or justifiably longer useful plant life?

It is reported that some states are considering the requirement of an overflow rate of 600 gallons per square foot per day. Can this be justified in terms of a better effluent? If so, is a better effluent required in each and every community? If a better effluent is required, can it be obtained more economically in another way? The same factors apply to a recent requirement of at least one eastern state limiting primary clarifier weir overflow rates to ten or fifteen thousand gallons per foot of length. Does this requirement improve the quality of the effluent? We know of no proof whatever that it does; but we do know that it increases the cost, and materially, in the case of rectangular tanks which sometimes must be used, as where two settling tanks are required at a small plant.

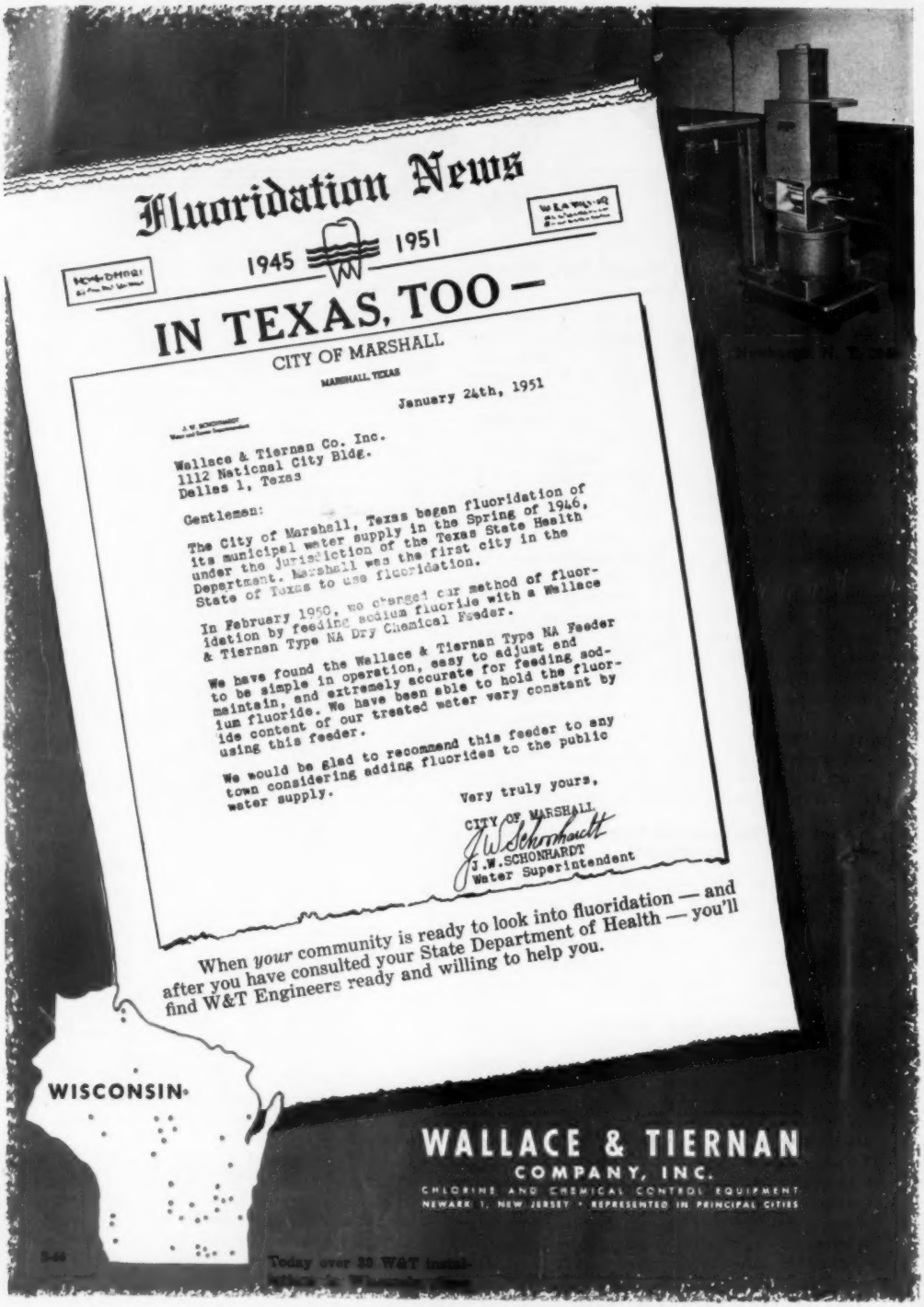
There are a lot of other things about some state requirements that would be humorous if they didn't tend to price some communities out of the sewage treatment market altogether and increase the cost very seriously at others. For instance, a plant can go unfenced and without a vacuum breaker for forty years; but start designing a new plant and these are almost sure to be among the musts. A fancy woven wire fence, like some states want, costs up to $8 a foot, and that isn't hay even for a small plant on a plot say four hundred feet square.

Some of our state sanitary engineers are mighty able folks; some seem a mite picayunish, to put it mildly. We'll be glad to hear from either or both categories on the questions we have raised; and what we have mentioned are by no means all that we can bring up. Perhaps there are reasons for all of these requirements. If so, we'd be happy to know about them.

Ways to Take Pressure Off Stretched Budgets

FACED with the increased necessity for lower costs for street and road construction and maintenance and for water and sewer construction, city and county engineering officials have turned to the use of labor saving machinery, and with it have found ways to take the tension out of some badly stretched budgets. A Florida city says that its new street sweeper has virtually paid for itself within one year from the time it was put into use. A front end loader and backhoe digs deep trenches for a Michigan city for 25 cents a foot and a larger bucket on the loader cut the cost of snow removal in half. Another city says that using power saws saved $80 per tree removed and that a cut requiring 38 minutes by hand could be made in 5 minutes by power saw.

These experiences and some fifty others are now being readied for publication in this magazine. Reading them is proof that our engineering skills and management abilities can meet to-day's municipal problems through the use of new and modern equipment.


Fluoridation News
1945 1951
IN TEXAS, TOO —
CITY OF MARSHALL
MARSHALL, TEXAS
January 24th, 1951
Wallace & Tiernan Co. Inc.
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Dallas 1, Texas
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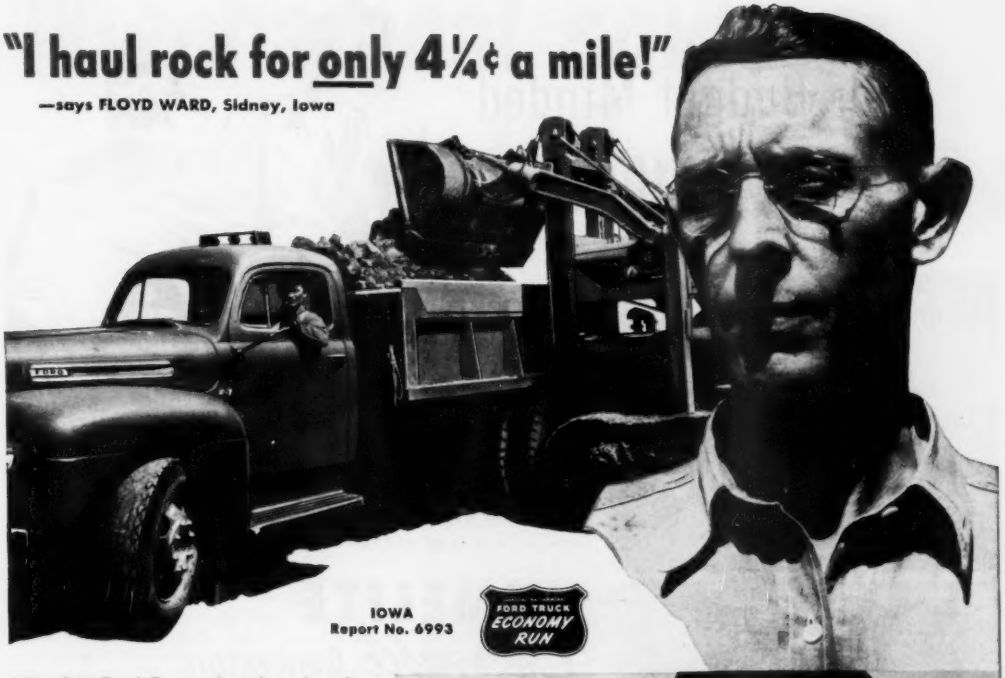

IOWA
Report No. 6993

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"My F-7 Ford Dump has less breakdowns and repairs," says Mr. Ward. "In rough going you can't beat Ford for gas, oil and repair economy!"

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That includes *your* state, county or municipal equipment and emphasizes *your* responsibilities as a public official or engineer. To benefit fully from the productive life built into your "Cat" equipment, you must be alert to its needs as time and hard usage take their toll in wear and depreciation.

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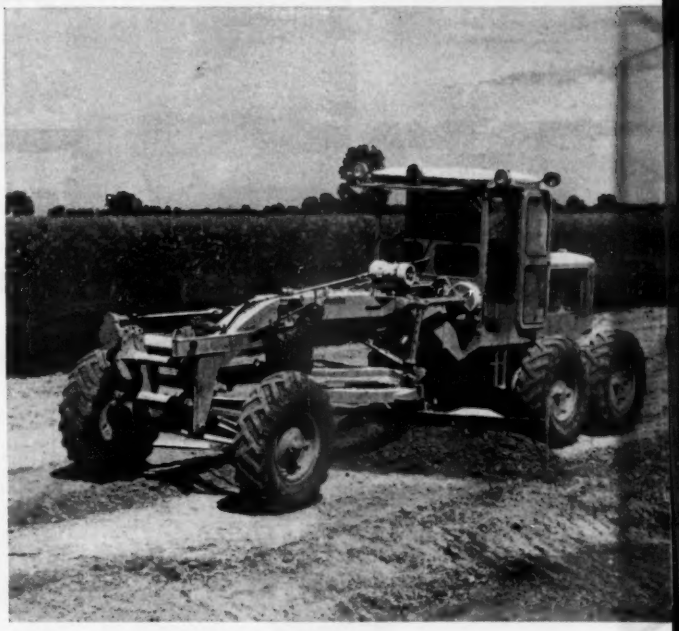
And how, too, are the Graders' blades? Your "Caterpillar" dealer can defer hard-to-get replacements by building up worn cutting edges. Take your problems to him and he'll be glad to make them his problems. He has the shop facilities, the skilled servicemen and the modern factory-devised techniques for doing astonishing parts-salvage jobs.



DO THIS NOW

YOU'RE THE DOCTOR

*Your Motor Graders' "shoes" are their tires. Their production depends greatly on the life of those tires. Check them regularly for cuts, breaks, and for sharp objects which may be working their way through casing and tube. Don't be a "hot rod." Keep wheels on the ground and don't spin them. Above all: *Reread your Operator's Instruction Book* regarding proper tire inflation and maintenance. Good care is good "medicine." Good care means sound tires. Sound tires mean steady performance and long service.

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-and H.O.R. knows how to build them!

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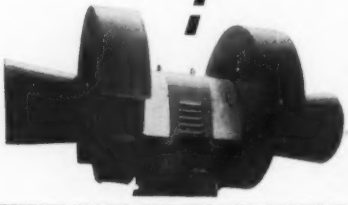
More and more BIG cities like New York are installing these SUPER Sirens for maximum coverage at lower cost.

With carefully timed revolutions these sirens spread a commanding umbrella of sound in all directions with equal and maximum intensity. Big cities and smaller cities, too, can now get the protection of the most powerful siren ever built!



For every city, . . . BIG and small - Rotating sirens from 15 to 40 H.P. -or stationary vertical sirens from ⅛ to 7½ H.P.

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* Full 360° coverage at half the price!

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CHICAGO TEST RESULT (Week of July 22)—H. O. R. Super Siren heard 4 miles in Loop Area!

NOW! A NEW PLAN...*

The only COMMUNITY-WIDE GARBAGE GRINDER PLAN that works!

Mr. Arthur Pickett, Deputy County Engineer of Los Angeles County and a national authority, in the January, 1951 issue of the American City Magazine, proposed a sound and unbiased Community Plan for the installation of garbage grinders. We sincerely urge all Public Officials to consider the merits of this plan, as it is designed to meet their most discriminating requirements.

THE COMMUNITY BENEFITS WHEN EVERYONE COOPERATES...

what the workable community-wide plan means to your community!

It is on record with the U. S. Public Health Service (Report No. 15, Vol. 63) that practically every community in the United States has a serious garbage problem. This problem affects the health of the community and is becoming most costly to solve with present garbage removal methods.

The antiquated methods of collecting garbage can be changed for the more practical, sanitary and economical method . . . the garbage grinder method that eliminates garbage at the point of origin . . . right at the kitchen sink in the home, restaurant and public institution.

GREATER HEALTH AND SANITATION

With this new, proven garbage disposing method, every home, public and commercial food-preparing establisment, *the entire community itself*, will be free of the very existence of garbage *forever!*

NO ATTRACTION FOR FLIES, RATS OR VERMIN.

NO OFFENSIVE GARBAGE ODORS.

NO UNSIGHTLY, SPACE-CONSUMING GARBAGE PAILS IN THE ALLEYS, BACKYARDS OR STREETS.

NO GARBAGE COLLECTION, LOWER COSTS

Another important advantage of a Community-wide Garbage Grinder Plan is its saving in labor and equipment. There's no garbage to collect, therefore, the costs in buying and maintaining equipment are drastically reduced to the bare requirements needed to collect rubbish only.

THE COMMUNITY-WIDE PLAN OFFERS 100% COOPERATION

The Public Official is relieved of the grievous and burdensome liability of financing and selecting garbage grinders. In all true analysis, the garbage grinder becomes the private property of the landowner, upon whose shoulders this responsibility would rest.

WE INVITE ALL PUBLIC OFFICIALS TO INVESTIGATE OUR COMMUNITY-WIDE GARBAGE GRINDER PLAN BY WRITING FOR THE COMPLETE PLAN IN DETAIL.

SEND FOR DESCRIPTIVE BOOKLET "COMMUNITY-WIDE GARBAGE-FREE LIVING." No obligation!

Waste King
KITCHEN
PULVERATOR
CONTINUOUS-FEED

GIVEN MANUFACTURING CO., LOS ANGELES, CALIF.

Dept. PW8, Given Manufacturing Co.
1250 Wilshire Blvd.,
Los Angeles 17, Calif.

Please send my complimentary copy of "Community-wide Garbage-free Living." I am interested in the Community-wide Garbage Grinder Plan.

Name_____

Title_____ Dept._____

Address_____

City_____ State_____

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Now's the time to mail this month's Readers' Service card.

FOSTER FLOW TUBE*

SHORT... not long!

The picture above sectionalizes one of our standard 12 inch Foster Flow Tubes. Put a rule on it, lengthwise and diametrically. What do you make the length-diameter ratio? About 1½ to 1?

Yes, 1½ to 1 is about the maximum ratio of length to diameter in the Foster Line of Flow Tubes in sizes 3" and above. Some units have less than a 1 to 1 ratio, particularly when high velocities are encountered. What does this mean to you in the way of installation costs and housing? You can readily picture how easy it is to set the Tube in a line. Just like a section of pipe. And with this compactness is an accuracy which not only equals the accuracy of conventional long primary devices but in most cases exceeds it. This is due to the greater pressure differentials for any given main-to-throat reduction.

Yes, you get great compactness and ease of installation with the Foster Flow Tube. You also can count on satisfactory accuracy. As for your specific applications, write us in detail giving both processing and installation requirements. Standard sizes come in all commercial pipe diameters, flanged or screwed connections. Standard lining is bronze; other metals to order.

*A Proved Flow Tube Added to Foster Line of Regulating Valves

FOSTER ENGINEERING Company

835 Lehigh Avenue • Union, N. J.

PRESSURE REGULATORS... RELIEF AND BACK PRESSURE VALVES... CUSHION CHECK VALVES... ALTITUDE VALVES... FAN ENGINE REGULATORS... PUMP GOVERNORS... TEMPERATURE REGULATORS... FLOAT AND LEVER BALANCED VALVES... NON-RETURN VALVES... VACUUM REGULATORS OR BREAKERS... STRAINERS... SIRENS... SAFETY VALVES... FLOW TUBES

Need more facts about advertised products? Mail your Reader's Service card now.

LETTERS TO THE Editor

WE ARE SORRY

In the article in your July issue "How Rebuilder of Brooklyn Bridge Overcame Two Problems", it was incorrectly intimated that the engineers of the contractor were responsible for the solution of several difficult problems arising in the reconstruction. All engineering problems were solved by the engineers of the Department of Public Works of New York City, of which Frederick H. Zurmuhlen is Commissioner; J. Frank Johnson is Director of the Division of Bridges; and D. B. Steinman is consulting engineer. The contractors, Klevens Corp., carried out in detail the instructions of the Department of Public Works.

Ben B. Bliss,
Ben B. Bliss Co.,
New York, N. Y.

Ed. Note: We regret that in the titling and arrangement of the article we did not give due credit to the fine work that is being done by the New York City Department of Public Works, under the direction of Mr. Zurmuhlen.

CALIFORNIA SUBDIVISIONS

The water pollution control program in California is now well under way, and we have plenty of problems. Each of these is studied separately, taking into account beneficial uses of the water, isolation and other factors. The rapid growth of population out here has caused the development of subdivisions far away from cities or towns. The lack of sufficient tax base has, at times, precluded the construction of the proper kind of sewage treatment facilities from the long range point of view. Septic tanks, or more properly leaching fields, have proved unsatisfactory, in large measure, due to impervious soil. Sewer wells cannot be allowed to pollute ground water. The small package plant is one answer, but not a wholly satisfactory one, in my opinion. Proper operation and maintenance is difficult to obtain and when there is eventually sufficient development

Here's the greatest little crawler tractor you've ever seen . . . the new Oliver Industrial "OC-3". It's ideally balanced for most effective loading and dozing . . . engine is mounted *back* so that front of tracks and radiator are practically in line. This better balance gives you 40% more lift with a front end loader . . . does a superior job of dozing and grading because blade is mounted close to the tracks for easier handling . . . precise control! And, operators find this balanced tractor far easier to handle . . . far less fatiguing.

The new Oliver Industrial "OC-3" gives you a full 22 drawbar horsepower . . . plenty of power for jobs in its size. It's ruggedly built for the tough jobs . . . keeps maintenance costs down. Complete accessibility makes servicing easy.

For the complete story on the new Oliver Industrial "OC-3" and how it can help your operations, see your Oliver Industrial Distributor.

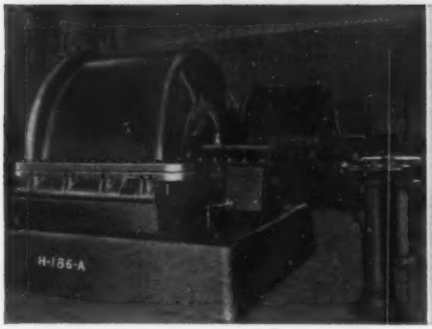
THE OLIVER CORPORATION

Industrial Division: 19300 Euclid Avenue, Cleveland 17, Ohio

A complete line of industrial wheel and crawler tractors

It's a fact . . . our handy Readers' Service card is the easy way to get new catalogs.

Keep your eye on V·P·I
WHEN SELECTING
BLOWERS



CENTRIFUGAL

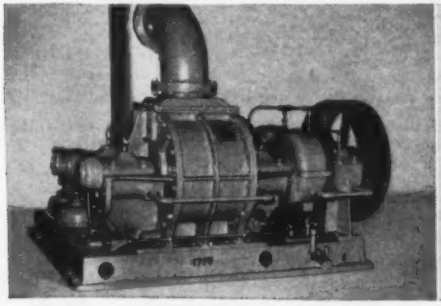
This Type H, 3-Stage Centrifugal Blower, with capacity of 15,000 cfm, is one of many R-C units used by this large eastern city in sewage treatment service.

Sewage treatment plants can't afford to risk shutdowns because of unsatisfactory or inadequate equipment performance. To maintain required rates of flow, calls for blowers that continuously deliver positive Volume at required Pressure—and at Low power costs to reduce operating expense.

You get these 3 essentials from R-C Blowers. Whether your needs call for Centrifugal or Rotary Positive units, we can match them from our exclusive *dual-ability line*. With capacities from 5 cfm to 100,000 cfm, you can usually find R-C units that closely fit your demands, with resultant savings in time, cost, space, weight and power.

From an experience of almost a century of blower building, our engineers will gladly make suggestions of the right R-C equipment for industrial or municipal sewage treatment plants of any size.

ROOTS-CONNERSVILLE BLOWER CORPORATION
510 Poplar Avenue, Connersville, Indiana



ROTARY

Type RCDH Rotary Positive Blower installation in sewage treatment plant in central New York City. Capacity 2,000 cfm.

ROOTS-CONNERSVILLE
BLOWER BUILDERS SINCE 1854
ONE OF THE DRESSER INDUSTRIES

Get full details of this month's new products . . . mail your Readers' Service card today.

to justify construction of a full-scale plant, the taxpayers feel that they have already built and paid for a plant once.

John B. Harrison,
Executive Officer,
Regional Water Pollution Control Board,
Oakland, Calif.

MORE NEWS FROM JJH.

This tour of duty as "Superintendente" of the new Guyaquil water plant is a most interesting and instructive one. It is a 20 mgd plant, designed by Buck, Siefert and Jost of New York. It includes a diesel powered pumping station on the Rio Daule, aeration, presedimentation, coagulation and settling and filtration. There are eight 2.5-mgd filters. There is both pre- and post-chlorination; and the water is stabilized with lime. The water is soft and has a variable turbidity—50 to 1200 ppm, so far. Mrs. Hinman, our daughter and two grandsons are here and we all live at the Grand Hotel Crillon.

I expect to be back in the US about the first of September. While I have no special plans in mind for work after I return, I hope something interesting and important will turn up. I will have some new yarns and new pictures when I get home.

Jack J. Hinman, Jr.,
Guyaquil, Ecuador,
South America.

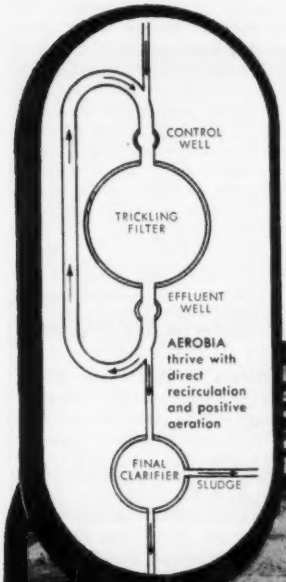
BOOKS IN BRIEF

REINFORCED CONCRETE

"Building Code Requirements for Reinforced Concrete" as adopted by the ACI last February, allows for improved properties of new-type deformed bars, resulting in steel savings in reinforced construction. This book covers, primarily, the design and construction of buildings. 60 pp.; American Concrete Institute, Detroit 19, Mich. 50¢.

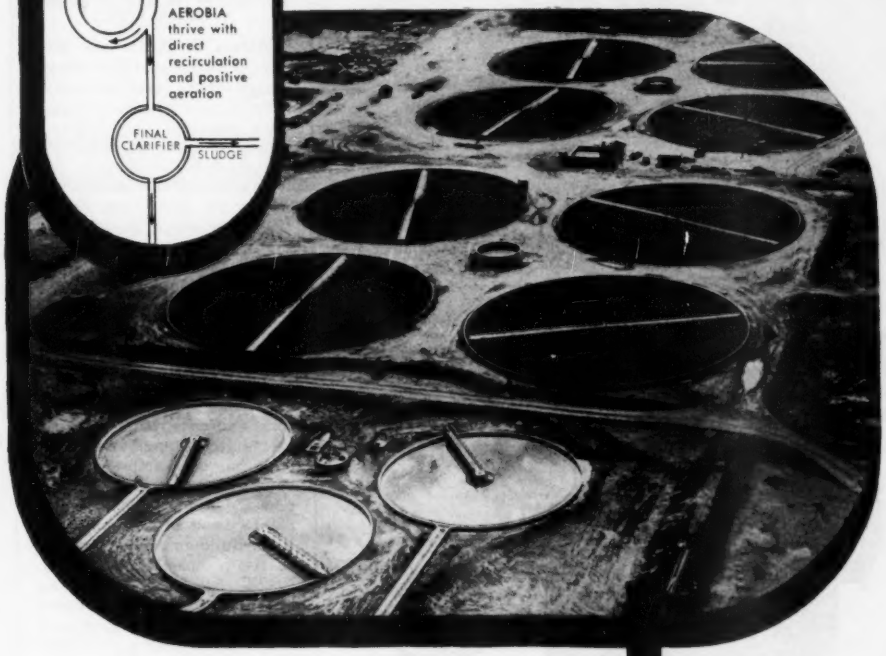
GROUND WATER CONSERVATION

Land-use developments, irrigation and drainage, waste disposal and other factors affecting the quantity and quality of ground water supplies are discussed. In a series of more than 70 case histories



how Worcester, Mass., modernized 1925 Sewage Plant with an

Accelo® Filter *system*



To give Worcester a modern 20,000,000 g.p.d. treatment plant, consulting engineers replaced 1925 equipment with the Infilco Accelo Filter system with *direct recirculation* and *positive aeration*. The system has 8 rotary distributors 176 ft. in diameter with aero-spray nozzles. Excellent distribution is obtained over filter surfaces with vigorous growth of bacterial gel. Three Infilco PD Clarifiers (foreground) provide effective final sludge removal.

Specify Infilco for:

- INCREASED FILTER EFFICIENCY
- NO INCREASE IN CLARIFIER SIZE
- INCREASED CAPACITY
- NO CLOGGING, SLOUGHING OR PONDING
- NO ODORS
- REDUCED PSYCHODA FLY NUISANCE

INFILCO

BETTER WATER CONDITIONING AND WASTE TREATMENT SINCE 1894

INFILCO INCORPORATED | *Tucson, Arizona*

FIELD ENGINEERING OFFICES IN 26 PRINCIPAL CITIES

World's Leading Manufacturers of Water Conditioning and Waste-Treating Equipment

Thousands use our Readers' Service card to keep up to date . . . do you?

Preferred power on portable power saws — the world's most widely used single-cylinder gasoline engines on hundreds of kinds and types of machines, tools, appliances used by industry, construction, railroads, oil-fields, and on equipment for farms and farm homes.

DEVELOPED through years of building the right power for the toughest service, Briggs & Stratton single-cylinder, 4-cycle, air-cooled gasoline engines assure the best in performance, long life, economy. Briggs & Stratton Corporation, Milwaukee 1, Wisconsin, U. S. A.

In the automotive field Briggs & Stratton is the recognized leader and world's largest producer of locks, keys and related equipment.

Now's the time to mail this month's Readers' Service card.

of specific areas, the author presents various ground water problems that have arisen in the U. S. and outlines the measures that have been or could be taken to solve each. There are maps of ground water availability, overdraft, salt-water intrusion, etc., and much other useful data. By Dr. Harold E. Thomas, USGS; McGraw-Hill Book Co., New York. $5.

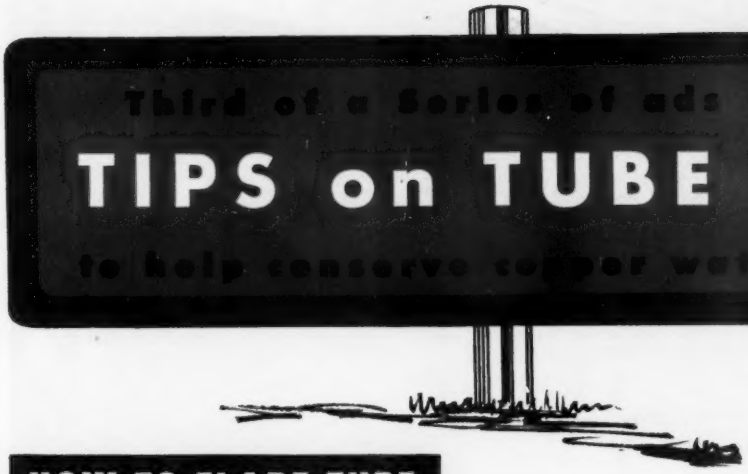
LEADERS IN THE PUBLIC WORKS FIELD

Marion E. Boriss has been city engineer of Chattanooga, Tenn., for the past four years. Prior to that time he was sanitary engineer for Jefferson County, Ala., in charge of the county-wide sewerage and sewage treatment system. He was in the Army from 1942 to 1945, entering as an officer of the Corps of Engineers and transferring to the Sanitary Corps in 1944, as a Major; and is now a Major, Corps of Engineers, Reserve. He was graduated from Auburn, down in Alabama, in 1926 with the degree of BS in CE. His wide experience has covered structural and construction, as well as municipal, engineering.

He has been active in many engineering societies and is now a director of the Municipal Division of the American Road Builders Association. He is also a member of ASCE, NSPE, APWA, AWWA and FSIWA. He is a registered engineer in Tennessee and Alabama; a 32nd degree Mason; a Baptist; and a member of Civitan.

He has a most charming wife and two children, a daughter, Jane and a son Alexander. As to hobbies, he suggests "with much hesitation" golf, but notes that "since you have played with me, I assure you that I am probably a better fisherman."

It is with special personal pleasure that the editor presents this brief review of one of our outstanding younger engineers, who has done a fine job wherever he has been, whether in Birmingham, in the Army or at his present post.

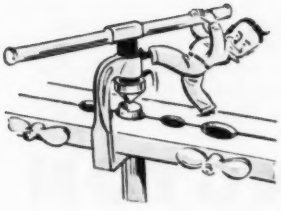


HOW TO FLARE TUBE

Flaring of tube is one of the most important operations in making joints or connections.

A word of caution. After cutting tube to length, do not disregard the burr resulting from cutting operation. The thin burr section is the first to be cold-worked during the flaring operation and tends to cause cracking of tube. A crack, once started, travels into and through the tube wall, leaving whole flared section useless.

Always cut tube to length with hacksaw or tube cutter. Be sure to remove burr with knife or sharp cutting edge. Accomplish actual flaring by using good standard flaring tool. Result: a clean, perfect flare, which will contribute to a leak-proof joint and a good, sound connection.



Choose good tube first—care makes it last.

WOLVERINE TUBE DIVISION
Calumet & Hecla Consolidated Copper Company
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Manufacturers of seamless, non-ferrous tubing
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Plants in Detroit, Mich. and Decatur, Ala.

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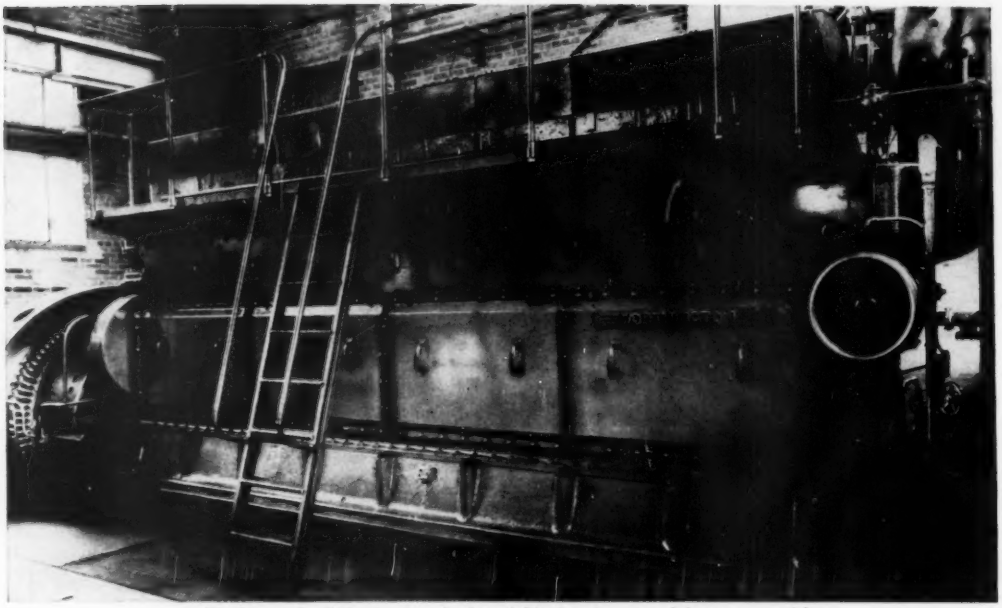

Worthington 8-cylinder 4-cycle turbo-charged Diesel engine—one of the two operated by Elko-Lamoille Power Company. This 1000 Kw-rated engine was installed on the same foundation originally built for an engine with 250-Kw rating.

Lesson in Cost Reduction

FROM THE MIDDLE OF THE DESERT

If you've never heard of Elko, you'll find this story interesting.

Elko is the seat of a county in Nevada that, all by itself, is larger than Massachusetts, Connecticut and Rhode Island together, with Delaware thrown in. Since pioneer days, it has been a transportation and trading center.

Elko's present power plant set-up, which includes two four-cycle turbo-charged Worthington Diesel engines connected to 1000-Kw generators, contrasts with the single 50-hp steam engine purchased second-hand in 1896 from a nearby silver mine.

Cost of power has never been more reasonable. Ever since 1940 when fuel oil cost this plant less than half what it does now, power rates have *gone down*—having been reduced twice during the period. Today, 87% of the power is produced by the two Worthington units, and in 1950 the plant averaged 13.3 Kw-hrs per gallon of fuel.

Lubricating oil consumption is low, too—well below the estimated 4,000 rated horsepower hours per gallon.

Want more evidence that there's *more worth in Worthington?* Write Worthington Pump and Machinery Corporation, Engine Division, Buffalo, N. Y.

WORTHINGTON

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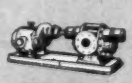
ECONOMICAL CONTINUOUS POWER

Diesel Engines, 150 to 2640 hp
Gas Engines, 190 to 2880 hp
Dual Fuel Engines, 345 to 2640 hp

WORTHINGTON-BUILT AUXILIARIES

Balanced Angle Compressors

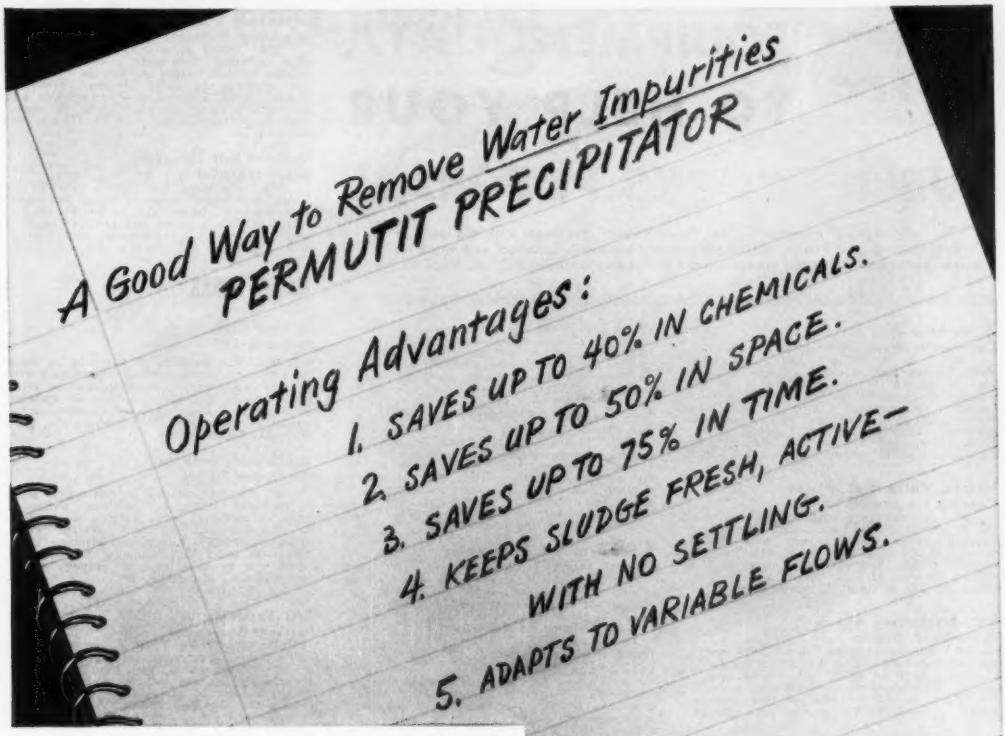


Oil Transfer Pumps

Cooling Water Circulating Pumps

Evaporative Type Engine Water Coolers

It's a fact . . . our handy Readers' Service card is the easy way to get new catalogs.


A Good Way to Remove Water Impurities
PERMUTIT PRECIPITATOR
Operating Advantages:
1. SAVES UP TO 40% IN CHEMICALS.
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3. SAVES UP TO 75% IN TIME.
4. KEEPS SLUDGE FRESH, ACTIVE—
WITH NO SETTLING.
5. ADAPTS TO VARIABLE FLOWS.

HOW IT WORKS:

The Precipitator operates on the principles of precipitation, absorption, settling, and upward filtration. It is adaptable for water softening, removal of turbidity, color, taste, odor, alkalinity, silica, and fluorides.

Precipitator capacities range from 1,000 gals. per day to 10,000,000 gals. per day. Batteries handling up to 120,000,000 gals. per day are currently in use in some municipalities.

Write for free bulletin to The Permutit Company, Dept. PW-8, 330 West 42nd Street, New York 18, N. Y., or to Permutit Company of Canada, Ltd., 6975 Jeanne Mance Street, Montreal.

PERMUTIT®

WATER CONDITIONING HEADQUARTERS FOR OVER 38 YEARS

Get full details of this month's new products . . . mail your Readers' Service card today.

Free EQUIPMENT DATA TO HELP YOUR PUBLIC WORKS PROGRAM

The engineering information in these helpful catalogs will aid you in Engineering and Public Works programs. Just circle numbers you want on the coupon or write the manufacturer direct and mention PUBLIC WORKS.

A Working Plan for Community-Wide Garbage Grinding

30. In a descriptive booklet "Community-Wide Garbage-Free Living" a sound working plan is outlined for the installation of garbage grinders to eliminate the headaches of garbage collection and disposal, yet at the same time relieving the public officials of difficult financing problems. Get your copy from Given Mfg. Co., Dept. PW-8, 1250 Wilshire Blvd., Los Angeles 17, Calif. Use the coupon today.

Helpful Valve and Fittings Catalog for Engineers

42. A complete 44-page catalog covering the M and H line of water works and sewage disposal equipment and accessories is offered to help design engineers and contractors who specify valves, hydrants and fittings. Get Catalog 34 from M & H Valve & Fittings Co., Anniston, Ala. by using the handy coupon.

Salt Stockpiling Allows Economical Buying

43. With inexpensive "Rayn-Shed" covers you can buy rock salt in economical quantities and stockpile it for winter use. Check coupon now to get data sheet for estimating sizes of Rayn-Shed covers for your storage requirements. Cayuga Rock Salt Co., Inc., Myers, N. Y.

General Catalog on Water and Sewage Treatment Equipment

39. In a new 16-page bulletin, No. G50, Walker process equipment for water and sewage treatment is illustrated and described in detail. Get this useful data by checking the coupon. Walker Process Equipment, Inc., Aurora, Ill.

3 to 5 Ton Tandem Roller Has Many Uses

84. The Galion Iron Works & Mfg. Co., Galion, Ohio, has just issued a catalog on their new model 3-5 ton Variable Weight Tandem Roller. The many improvements in construction and operation are fully described and illustrated. Get your copy of Catalog 360 by checking the coupon.

Modern Convenience for Soldering and Melting Metals

85. Insto-Gas torches and furnaces give trouble-free service for lead melting, soldering, all other jobs where a steady, clean, hot flame is needed. Convenient cylinders require no regulating gauges, attach directly to standard furnace assembly. Get Form 222 for full details by checking handy coupon. Insto-Gas Corp., Detroit 7, Mich.

Non-Clogging Underdrain System For Water Purifying

92. The Layne Multi-Plate system for gravity or pressure-type filters provides for perfect collection of water from the filter bed and assures even and efficient filter backwash. Cutaway views and drawings in Bulletin 5128 show how Multi-Plate baffles are installed. Check coupon for your copy from General Filter Co., 923 Second St., Ames, Iowa.

9 Ways to Get More Miles Out of Truck Tires

105. A new bulletin of this title gives a wealth of easy-to-understand information on the subject of tire conservation. Published by B. F. Goodrich Co., Akron, Ohio. Copies are available by checking the coupon.

Pump Motors Featured In 24-Page Booklet

110. In a new publication of the Electric Machinery Mfg. Co., Minneapolis 13, Minn., there are articles on storm water pumping, application of large a-c motors to centrifugal pumps, variable speed drives for water works and sewage pumps and many other features, plus helpful engineering information, charts and diagrams. Get your copy of "Synchronizer No. 33" by checking the coupon.

Small Gravel Plant For Counties and Towns

120. A single pass gravel plant has been designed especially for use by counties and towns where mobility counts in processing gravel on small jobs. Three plants with a capacity range from 20 to 65 tons per hour are described in Bulletin CP-1, issued by Diamond Iron Works, Inc., Minneapolis 11, Minn. Just check the coupon for details.

Air Polution? Here's One Answer

142. A simple method for reducing smoke nuisance is offered by Delta Engineering Co., 75 E. Wacker Dr., Chicago 1, Ill. Get full information on the Delta Catalytic Combustion Process to help your city air pollution control program. Just check the coupon.

Give Your Maps Sparkling Neatness

124. Names of streets, cities, rivers, all other lettering and symbols can be placed quickly in their proper position on your maps and drawings by using Monsen "Trans-Adhesive" Type Impressions. Get samples and map type specimen book by using the handy coupon. Monsen-Chicago, 22 E. Illinois St., Chicago, Ill.

Uniform Salt Spreading Saves Material

145. The wide, thin pattern provided by Tarco "Scotchman" spreaders avoids salt waste, saves time and labor. Get Folder BL for full details on this spreader and table of material application rates. Use coupon or write Tarrant Mfg. Co., Dept. PW, Saratoga Springs, N. Y.

WATER WORKS

Is Your City Metered 100%

33. 100% metering as practiced by many cities requires accurate, dependable meters with interchangeable parts. Cut-away views of every part, capacity and size data are all included in handsome American-Niagara water meter booklet available from Buffalo Meter Co., 2920 Main St., Buffalo 14, N. Y.

Engineering Data on Diatomite Filters

44. Detailed information and typical plans of Sparkler diatomite filters for swimming pools of municipal water systems is available to engineers and municipal officials. These filters feature self-cleaning filter elements which cuts wash water to a minimum. Get this material now by using coupon. Sparkler Manufacturing Co., Mundelein, Ill.

The Turbidimeter Without Standards

51. The Hellige Turbidimeter is designed for accurate measurement of water turbidity, sulfate determinations, and measurements of suspended solids and colloids in general. No standards must be prepared for use with this instrument. Detailed description of working principle and the instrument itself covered in Catalog 8000-A, available from Hellige, Inc., Dept. PW, 3718 Northern Blvd., Long Island City 1, N. Y., or by checking handy coupon.

MORE LISTINGS ON PAGES 28 TO 36

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AND MAIL TODAY

READER'S SERVICE DEPT. PUBLIC WORKS MAGAZINE 310 East 45th Street, New York 17, N.

Please send me the following literature listed in the Reader's Service Dept. of your August issue.

Booklets from page 26-36:

20	23	27	29	30	33	34	37	39	42	43	44	45	46	49	50	51	54	55
58	59	68	69	72	75	76	80	82	84	85	86	88	89	90	92	94	96	98
105	107	109	110	112	120	122	124	126	128	130	131	132	137	142	143	145	150	151
152	153	154	156	157	160	164	166	167	169	172	173	180	183	184	185	191	192	194
200	202	210	215	226	239	240	242	243	253	271	272	274	278	281				

New Products, pages 97-100:

8-1 8-2 8-3 8-4 8-5
8-6 8-7 8-8 8-9 8-10
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Here's what WE mean by

EASY TO OPERATE

Operators have long awaited the greater handling ease and comfort now brought to them by this new line of Allis-Chalmers tractors.

Conveniently located controls respond to the slightest effort . . . and are operated in the same familiar way — nothing tricky to "catch on to." There is new shifting ease, new seat and platform comfort, full visibility.

Because the operator's job is easier—takes less effort — he can maintain a steady pace, do a better job throughout his shift . . . day after day.

Look over some of the many reasons why this NEWEST, FINEST TRACTOR LINE ON EARTH is easy to operate . . . as well as being built to "take it," easy to service and entirely new in performance. Then get the full story from your Allis-Chalmers dealer.

- ✓ REVOLUTIONARY SHIFT PATTERN. A quick, one-lever shift from any forward to any reverse speed. No "double" shifting to obtain high reverse speeds. Saves time and effort.
- ✓ MASTER CLUTCHES with large diameter plates and steering clutches with hydraulic or mechanical boosters require less effort. All control linkage is equipped with anti-friction needle bearings.
- ✓ STEERING BRAKES are self-energizing for both forward and reverse travel. Pedals adjustable to operator.
- ✓ QUICK ELECTRIC STARTING on diesel fuel from operator's seat. Tractors go to work faster. No fuel waste or engine wear by needless idling to avoid restarting.
- ✓ THROTTLE CONTROL, conveniently located, easy and positive (stays put).
- ✓ ROOMY, ADJUSTABLE, CUSHIONED SEAT with wide arm rests. Operator works in real comfort with either front or rear-mounted equipment.
- ✓ FULL VISIBILITY. Tapered hood, narrow cowl and clean rear-end design provide clear view of front and drawbar work.
- ✓ AMPLE LEG ROOM. Clean platform. Footrests for added comfort on larger models.
- ✓ BUILT-IN PRIMER SYSTEM (standard) makes starting quick and easy even in sub-zero weather.

ALLIS-CHALMERS

TRACTOR DIVISION — MILWAUKEE 1, U. S. A.

The Newest, Finest Tractor Line on Earth!

40.26 drawbar hp.
11,250 lb.

70 drawbar hp.
18,800 lb.

102 drawbar hp.
27,850 lb.

Hydraulic Torque Converter Drive
175 net engine hp.
41,000 lb.

- DESIGNED FOR YOUR JOB
- BUILT TO "TAKE IT"
- EASY TO OPERATE
- EASY TO SERVICE

Efficient Coagulation With Ferri-Floc

69. Advantages claimed for Ferri-Floc as a coagulant include wide pH range, quick floc formation, manganese removal, control of certain tastes and odors, plus other aids in high quality water production. Check coupon for complete Ferri-Floc data. Tennessee Corp., Grant Bldg., Atlanta, Ga.

Factors to Consider in Elevated Tank Selection

80. An interesting discussion of the factors to be considered for selection of elevated capacities and sizes, required fire flows and other useful data are included in a bulletin on elevated water storage published by Pittsburgh-Des Moines Steel Co., Neville Island P. O., Pittsburgh 25, Pa.

Cement Lining for Smaller Diameter Water Lines

89. Water lines from 4" to 12" diameter are now cement-lined in place by Centriline Corp., using the Tate process. Catalog C-50 tells how this operation gives new pipe performance to old lines, and shows just how the work is done. An interesting folder, well worth studying. Check coupon for your copy. Centriline Corp., 140 Cedar St., New York 6, N. Y.

Painting Water Tanks For Longer Protection

94. High labor costs demand special consideration when painting elevated water tanks. This and other factors involved in proper paint selection are discussed in a bulletin issued by Jos. Dixon Crucible Co., Dept. 8 P, Jersey City 3, N. J. Helpful specifications for repainting water tanks are also included.

Rapid Sand and Pressure Filter Data

109. Rapid sand filters. A complete line of vertical and horizontal pressure filters, wooden gravity filters, and filter tables and other equipment. For engineering data, write Roberts Filter Manufacturing Co., 640 Columbia Ave., Darby, Pa.

Specs for Gate Valves

112. Rigidly inspected gate valves for pressures up to 175 lbs. by R. D. Wood Co. Sizes 2" to 30"; for any standard type joint. R. D. Wood Co., Public Ledger Bldg., Philadelphia 5, Pa.

How to Tap Concrete Pressure Pipe

126. The simple steps required in making a pressure tap in concrete pressure pipe are explained in a booklet issued by Lock Joint Pipe Company. Be sure you know how either large connections or small service outlets may be made economically and without sacrifice of strength. Just check the handy coupon. Lock Joint Pipe Co., Box 269, East Orange, N. J.

Rehabilitation for Your Water System

153. Whether your water supply system requires a complete rehabilitation program including an engineering survey, hydraulic analysis, reconditioning and related construction, or merely pipe cleaning and coating, it is wise to plan your campaign without delay. Get full data now on the requirements to put your system in top condition. Write Pittsburgh Pipe Cleaner Co., 133 Dahlem St., Pittsburgh 6, Pa., or check handy coupon.

Complete Equipment for The Complete Pool

157. Latest equipment for recirculation, filtration, chlorination, softening and pH control are described in Permutit Bulletin No. 2157. Manual and automatic valves explained and many installations diagrammed. Complete specifications given. Permutit Co., 330 West 42nd St., New York 18, N. Y.

What You Should Know About Meter Setting and Testing Equipment

166. Complete details on all equipment and proper methods for meter testing and installation are included in an excellent book published by Ford Meter Box Co., Wabash, Ind. All waterworks men concerned with setting and testing of water meters should have a copy of this book. Write for Catalog No. 50

Handy Catalog Covers All Pipe Repairs

167. A complete catalog covering repair clamps, packings and gaskets of several designs to suit all needs is offered by the Smith-Blair Co. Directions for use show ease of application. Every water works needs a copy of this catalog for ready reference. Available by using coupon or writing Smith-Blair, Inc., 535 Railroad Ave., So. San Francisco, Calif.

Helpful Data on Well Water Systems

173. A comprehensive, 48-page book on Layne Water Well Systems covers gravel wall wells, underreaming, cemented walls, rock wells and other well types. Applications of shutter screens and vertical turbine pumps are shown, together with water treatment and conditioning equipment. Ten pages are devoted to useful engineering tables and measurement data. Check the coupon today or write Layne & Bowler, Inc., Dept. PW, Memphis 8, Tenn.

Engineering Data On Mechanical Joint C.I. Pipe

183. General specification, weights and dimensions of mechanical joint cast iron pipe and fittings are furnished in a 32-page booklet issued by Alabama Pipe Co., Anniston, Ala. Get this helpful data by checking coupon.

Installation Guide for Transite Pressure Pipe

192. A convenient, pocket-size book of 115 pages covers the whole job from receiving and handling pipe to pressure and leakage tests of finished lines. Over 100 drawings show important operations, and the text tells both how and why. Copies are available from Johns-Manville, Dept. PW, 22 E. 40th St., New York 16, N. Y.

Chlorination for Large and Small Pools

210. Dependable chlorination is a necessity for all swimming pools, no matter how large or small. You can find out just how to protect your pool in the most dependable and economical way by using the coupon or writing Wallace & Tiernan Co., Inc., Box 178, Newark 1, N. J.

Investigate This Compact Flow Meter for Water

226. The Foster "Flow Tube" is a new metering element that is compact and easy to install. Bulletin FT illustrates simple element containing nozzles for differential pressure production and shows capacity range and accuracy. Made in standard type sizes. Foster Engineering Co., Union, N. J. will send copy, or use coupon.

Automatic Pump Control For Your Water System

239. In Bulletin 230-G4. Builders-Providence outlines the "Pressureflo Control" system which is said to save on first cost by providing ground level storage in residential areas; permit unattended operation of outlying stations; furnish instantaneous response to meet fire flow. Flow diagrams and typical applications are included. Mail coupon to check this versatile system. Builders-Providence, Inc., Providence 1, R. I.

Design Data for Hardness, Turbidity, Color or Algae Removal

253. Bulletin No. 9041 published by The Dorr Co. furnishes design data on the Hydro-Treator for high-rate, upflow type treatment of municipal and industrial water supplies. 32 pages include distinguishing features of the unit, types and sizes, capacity ratings and typical operating results. Get your copy of this helpful bulletin by using coupon today. The Dorr Co., Barry Pl., Stamford, Conn.

How to Compute Quantities of Jointing Materials

271. A helpful table for determining quantities of "Tegul-Mineralead" required, using jute or 'Hyde-Ro Rings", plus complete answers to your questions on sulfur compound jointing materials will be found in Bulletin M-10 issued by Atlas Mineral Products Co., Mertztown, Pa. Check the handy coupon today.

Standard Specifications for C. I. Pipe and Fittings

278. Standard dimensions for cast iron water pipe and special castings are available in a convenient booklet offered with the compliments of U. S. Pipe and Foundry Co., Burlington, N. J. Get your copy by checking the coupon.

ONAN
Emergency Electric Plants
for Civil Defense

No matter what happens to central station power during a bombing attack, electricity for essential defense needs is always available with Onan Electric Plants. Onan units, mounted on truck or trailer, or carried in the trunk of a car, can be rushed to any point where power and light are needed. Sturdy and dependable, Onan Electric Plants are an important link in a city's defense against disasters of any kind.

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Power & Light for Every Need

Portable, Mobile, or Stationary
400 to 35,000 watts. A.C. or D.C. models.

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formed under vacuum for greater strength

Vitrified CLAY PIPE

DE-AIRING — a process that makes Clay Pipe *stronger* for greater load-bearing, *denser* for less absorption, and dimensionally *truer* for faster installation — takes place in a vacuum press as the pipe is precision-formed under pressures as high as 75 tons.

De-airing, like the exclusive Vitrification process, is an outstanding example of technology at work for you . . . bringing you *better* Clay Pipe — stronger, denser, truer lengths for every sewerage and drainage use. Industry-wide research is constantly improving the traditionally high quality of Vitrified Clay Pipe — and developing new test procedures to *insure* consistent standards.

Vitrified Clay Pipe requires no "extras" . . . no special coatings to protect it from deterioration. It is corrosion-proof *throughout* — completely immune to destructive chemicals in soil, sewage, or industrial waste. You can specify it *safely*, with complete assurance that Clay Pipe *never wears out.*

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100 N. LaSalle St., Rm. 2100, Chicago 2, Ill.
206 Connally Bldg., Atlanta 3, Ga.
703 Ninth & Hill Bldg., Los Angeles 15, Calif.
311 High Long Bldg., 5 E. Long St., Columbus 15, Ohio

SPECIFY *Vitrified* **CLAY PIPE**

WRITE FOR DETAILED INFORMATION

Additional information and data on Vitrified Clay Pipe, Wall Coping and Clay Flue Lining sent FREE on request. State your specific questions. Simply contact the regional office nearest you.

C-151-9

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SUPERIOR CURB & GUTTER *Forms*

Demand for Heltzel forms comes from experienced contractors who know Heltzel forms save time and money. TIME — because firmer installations can be made faster. MONEY — because Heltzel equipment lasts longer and involves less labor on the job. The example below of a flexible form is typical of Heltzel better built forms.

- CURB FORMS & ACCESSORIES
- COMBINED CURB & GUTTER
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- RIGID RADIUS FORMS
- FLEXIBLE FORMS
- SPECIAL FORMS

It's ideal where specifications do not permit dummy or full depth joints.
Overhead hanger with clearances for hand tooling has flexibility of position. Provides an unbroken curb.
Sturdy, easy handling face plates in either battered or non-battered types. Faster installation.
Heltzel BUILDS IT BETTER

HELTZEL CURB and GUTTER SUPPORTS

The only flexible form with three alternate methods of support — (1) Full depth division plates, (2) Skeleton division plates, and (3) Overhead hangers. All Heltzel forms improve contractors' operations, because they speed up job while making the work easier.

PUT HELTZEL TO WORK MAKING MONEY FOR YOU

Before you buy, before you start a job — check with Heltzel! Heltzel better built curb and gutter forms in standard types will save for you. Special shapes designed by Heltzel to job specifications make difficult jobs click like run-of-mine work. Write for information now.

HELTZEL STEEL FORM & IRON CO., WARREN, O., U.S.A.

Please send information regarding:

CURB and GUTTER FORMS _____

ROAD and AIRPORT FORMS _____

BATCHING PLANTS and BINS _____

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Address _____

City _____ State _____

Signed _____

HELTZEL STEEL FORM & IRON CO. WARREN, OHIO · U. S. A.

CONSTRUCTION EQUIPMENT AND MATERIALS

Your Dump Truck As a Complete Working Unit

39. The addition of a Holmes-Owen Loader to your dump truck converts it into a complete digging and loading unit that enables one man to load, haul and dump. Illustrated folder shows how this self-loading unit with hydraulic crowding action can be a real time and labor saver for the municipality or contractor. Check the handy coupon for full data. Ernest Holmes Co., Chattanooga, Tenn.

Shovel or Load With The Dempster Diggster

45. Automotive Hydra-Shovel digs 15 ft. above, 15 in. below grade, features independent hydraulic hoist and crowd action. Capacities 1 cu. yd. for digging solid earth, 1¼, 1½ and 2 cu. yd. for loading all types material. Get information from Dempster Brothers, Inc., 981 Dempster Bldg., Knoxville 17, Tenn.

Handbook of Contractors Pumps Is Easy to Use

49. Big 50-page Catalog P-10 covers dewatering pumps, pressure pumps, well points systems and electric pumps, and also features a special section of useful data which helps in the selection of the right pump for your job. Every construction engineer and contractor should have a copy of this valuable handbook. Just check the coupon. The Jaeger Machine Co., 400 Dublin Ave., Columbus 16, Ohio.

How to Keep Your Loader On the Job

50. Don't take more time to move your loader to the job than to do the work. Investigate the Eagle Truck Mounted Loader for handling gravel, sand, cinders, snow from windrows or piles. Get forms 444 and 947 from Eagle Crusher Co., Inc., Dept. PW 851, Galion, Ohio.

Municipalities Make Equipment Dollars Go Further

55. Be sure to get your copy of "Saving Facts" a new illustrated booklet prepared by The Oliver Corp. that shows how equipment dollars can be stretched on municipal work. Text and photos describe the application of tractors and money-saving attachments in street maintenance, snow removal, waste disposal, pipe laying and other projects. Write The Oliver Corp., Industrial Div., 19300 Euclid Ave., Cleveland 17, Ohio.

Data and Pictures of Complete Line of New Ford Trucks

58. Check this number on the coupon for colorful circular showing new Ford Trucks for every hauling need, available in great variety of standard, factory-built chassis and body combinations. Be sure to check these trucks on your job. Truck and Fleet Sales Dept., Ford Motor Co., Dearborn, Mich.

Check Your Power Needs Without Delay

68. International Harvester Company has available a new folder describing its line of diesel engines and power units for all your power needs up to 180 hp. For a copy of this colorful booklet, write to International Harvester Co., 180 N. Michigan Ave., Chicago 1, Ill., and ask for Form A-256-NN, or use the handy coupon and we will forward your request.

Tractors for Counties, Cities and Contractors

76. An attractive 24-page catalog portrays the Allis-Chalmers HD-5 crawler's abundant capacity and ability to meet the variable needs of counties, townships and contractors. Photographs and cutaway views illustrate its rugged construction and simplified maintenance. Use coupon or write Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee 1, Wisc.

Drill Concrete With Your Ordinary Electric Drill

82. Substantial cost-per-hole savings are claimed for Tilden Rotary Drills which penetrate concrete 2" to 4" per minute. Cutters can be resharpened. Available in sizes ¼" to 4". Get full data from Tilden Tool Mfg. Co., 209 Los Molinos, San Clemente, Calif.

THE MEMBERSHIP OF A DISTINGUISHED CLUB . . .

C.I.P. Century Club now has 38 Members

The Cast Iron Pipe Century Club is probably the most unusual club in the world. Membership is limited to municipal, or privately-owned, water and gas supply systems having cast iron mains in service for a century or more.

Although the Club is formally constituted, there are no dues, no regular meetings, and no obligations other than to inform the Recording Secretary if and when the qualifying water or gas main is taken out of service, or, sold for re-use.

In spite of the unique requirement for membership, the Club roster grows, year by year. And why not, when a survey sponsored by three water works associations, indicates that 96% of all 6-inch and larger cast iron water mains ever laid in 25 representative cities are still in service. And when answers to a questionnaire, mailed to gas officials in 43 large cities, show that *original* cast iron mains are still in service in 29 of the cities.

If your records show a cast iron main in service, laid a century or more ago, the Club invites you to send for a handsome framed Certificate of Honorary Membership. Address Thomas F. Wolfe, Recording Secretary, Cast Iron Pipe Century Club, Peoples Gas Bldg., Chicago 3, Illinois.

CAST IRON ®

CLUB ROSTER

DEPARTMENT OF WATER AND WATER SUPPLY
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BUREAU OF WATER, DEPT. OF PUBLIC WORKS
Baltimore, Maryland
CONSOLIDATED GAS ELECTRIC LIGHT AND POWER CO.
Baltimore, Maryland
PUBLIC WORKS DEPT., WATER DIVISION
Boston, Massachusetts
BOSTON CONSOLIDATED GAS CO.
Boston, Massachusetts
BOARD OF WATER COMMISSIONERS
Detroit, Michigan
FALL RIVER GAS WORKS COMPANY
Fall River, Massachusetts
CITY OF FREDERICK WATER DEPT.
Frederick, Maryland
GAS DEPARTMENT
City of Fredericksburg, Virginia
PUBLIC SERVICE COMMISSION
City of Halifax, N. S., Public Water Supply
THE HARTFORD GAS COMPANY
Hartford, Connecticut
BUREAU OF WATER
Lancaster, Pennsylvania
LOUISVILLE GAS & ELECTRIC CO.
Louisville, Kentucky
CITY OF LYNCHBURG WATER DEPARTMENT
Lynchburg, Virginia
MOBILE GAS SERVICE CORP.
Mobile, Alabama
MOBILE WATER WORKS COMPANY
Mobile, Alabama
WATERWORKS DEPARTMENT
City of Nashville, Tennessee
NEW ORLEANS PUBLIC SERVICE, INC.
New Orleans, Louisiana
PUBLIC SERVICE ELECTRIC & GAS COMPANY
Newark, New Jersey
DEPT. OF WATER, GAS & ELECTRICITY
New York, New York
DEPT. OF PUBLIC WORKS, BUREAU OF WATER
Philadelphia, Pennsylvania
PHILADELPHIA GAS WORKS CO.
Philadelphia, Pennsylvania
BUREAU OF WATER, DEPT. OF PUBLIC WORKS
Pittsburgh, Pennsylvania
POTTSVILLE WATER COMPANY
Pottsville, Pennsylvania
QUEBEC POWER COMPANY, GAS DIVISION
Quebec, Canada
BUREAU OF WATER
Reading, Pennsylvania
DEPT. OF PUBLIC UTILITIES
Richmond, Virginia
WATER & SEWERAGE DEPARTMENT
City of Saint John, N. B.
DEPT. OF PUBLIC UTILITIES, WATER DIVISION
St. Louis, Missouri
THE CONSUMER'S GAS CO. OF TORONTO
Toronto, Ontario
DEPT. OF PUBLIC WORKS
Troy, New York
CITY OF UTICA, BOARD OF WATER SUPPLY
Utica, New York
CITY OF WHEELING WATER DEPT.
Wheeling, West Virginia
WILMINGTON WATER DEPT.
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WATER DEPARTMENT
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WATER DEPARTMENT
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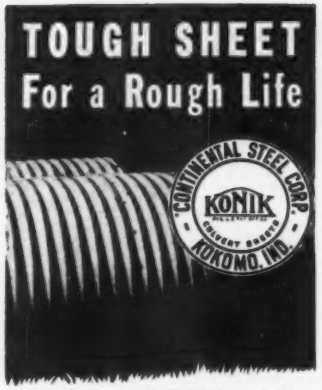

When you specify KONIK metal culvert sheets you can be sure you're getting extra years of trouble-free culvert service. KONIK stands the rigors of rough abuse—resists rust and corrosion—because it's a tougher culvert sheet. Copper, nickel and chromium make it tough and strong. That's what you need for a long culvert life. Insist on KONIK. Continental Steel Corporation, Kokomo, Indiana.

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Continental Culvert Sheet Distributors are glad to show the KONIK warranty and the certified analysis that assures longer culvert life with KONIK metal.

*Due to present National Defense requirements for nickel and chromium, two critical war materials, Continental Fence at present is available in Copper Steel only.

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MINERALEAD®
HYDRORINGS
HYDROPAC
GK sewer jointing compound

A complete line of jointing materials and accessories for water and sewer pipe. Specific bulletins and Technical Service available to help solve your problems.

Write 20 Walnut Street, Mertztown, Pa.

Over a half century of service

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MINERAL PRODUCTS COMPANY
MERTZTOWN, PA. HOUSTON, TEXAS

Grading Can Be Faster, Cheaper and Easier

96. You'll like every feature of the Austin-Western 99H Grader. It has all-wheel drive, all-wheel steer, controlled traction, precision sideshift and a high lift, extreme reach, reversible blade. Get data from Austin-Western Co., Aurora, Ill.

Bucket Loaders for All Materials Handling

132. Wheel- or crawler-mounted bucket loaders, 3 to 4 cym capacities are described in Form 507 issued by N. P. Nelson Iron Works, Inc., Clifton, N. J. Use the coupon today for full data on these versatile machines.

Versatile Maintainer Has Year 'Round Usefulness

151. A new bulletin shows how the sturdy Huber Maintainer will work for you the year 'round on maintenance jobs, berm leveling, road planing, bull-dozing, snow plowing, brooming, mowing shoulders and as a patch roller. Good ideas on how to do all these jobs in Bulletin No. M-138. Write Huber Manufacturing Co., Dept. PW, Marion, Ohio.

Proper Garage Ventilation Aids Equipment Maintenance

156. Cold months hamper motor maintenance in closed buildings unless proper ventilation is available. It will pay you to investigate the "National" garage ventilation systems for convenient removal of exhaust gases. Both underfloor and overhead designs are shown in detail in new bulletin. Use coupon or write to National Systems of Garage Ventilation, Inc., Dept. 16-D, 318 N. Church St., Decatur, Ill.

Manual on Retaining Wall Design

160. Embankment stabilization with Armco Bin-Type Retaining Walls is discussed in a 16-page illustrated booklet offered by Armco Drainage and Metal Products, Inc., Middletown, Ohio. Included are case histories which show embankments along highways, lakes, streams and city streets. Technical data covers selection of design and units required for various sections, curves and grades. Use the handy coupon.

Combination Overhead And Front-End Shovel

194. The "Lodover", described in Bulletin LO 200, is a combination overhead and front-end shovel for International T-9 and TD-9 tractors. By digging in front, swinging load overhead and dumping to the rear, extra yards are handled every hour. Regular front-end loading is not impeded in any way. Service Supply Corporation, 2004 Erie Ave., Philadelphia 32, Pa. Check handy coupon.

Have You Investigated Aluminum Gratings?

200. Aluminum gratings for walkways, bridge decking, and stair treads save weight, resist corrosion and are easily handled. Get complete design data, including safe load tables standard panel widths and weights, from Irving Subway Grating Co., 50-53 27th St., Long Island City 1, N. Y. Just check the handy coupon.

Design Data on Universal Concrete Cribbing

274. Complete information on concrete cribbing for embankment retaining walls, bridge abutments, highway underpasses and other structures will be found in a new bulletin issued by the Universal Concrete Pipe Co., 297 S. High St., Columbus, Ohio. Check coupon for free copy.

REFUSE COLLECTION AND DISPOSAL

20 Questions and Answers On Sanitary Landfill

75. The advantages of sanitary landfill, factors in site selection, kind and size of equipment needed, capacity of a given site and other important engineering considerations are discussed in Form 1084 prepared by the Tracksen Co., Dept. PW81, Milwaukee 1, Wis. Check the coupon for complete information on this refuse disposal method.

Efficient Material Handling to Reduce Incineration Costs

130. Blaw-Knox Buckets specially designed for refuse and garbage handling are described in 22-page Bulletin 2350. Illustrations show progress of material through a modern municipal incinerator plant. Dimensions and incinerator bucket specifications are included. Blaw-Knox Div., 2124 Farmers Bank Bldg., Pittsburgh 22, Pa.

Thinking of Sanitary Landfills? Get This Booklet Now

131. One of the most informative descriptions of the sanitary landfill method of garbage and refuse disposal is presented in Caterpillar's 16-page booklet "A Look to the Future with Sanitary Landfill." The booklet is designed to serve as a guide to proper site selections, the choice of the right equipment to do the job, and the actual operations of sanitary fill. Pictorial treatment shows how and when to start such a program, what to look for in a site, benefits received by the community, and other important considerations. Published by the Caterpillar Tractor Co., Peoria 8, Ill. Check the coupon for your copy.

Investigate This Plan For Garbage Elimination

164. A new presentation, written especially for municipal officials, offers a modern solution for the garbage disposal problem. Be sure you have this up-to-date information on the elimination of city garbage collection by the use of Hotpoint Disposall units. Check the coupon now. Hotpoint Disposall Department, 5600 West Taylor St., Chicago 44, Ill.

An Incinerator Necessity

215. Recuperators featuring individual replacement of the heat transfer elements (silicon carbide tubes) for maximum accessibility and efficiency are described and illustrated in Bulletin 14 issued by Fitch Recuperator Co., Dept. PW, Plainfield Nat'l Bank Bldg., Plainfield, N. J.

City-Wide Planning for Dual Waste Disposal

243. You can get full details on the General Electric "Disposall" plan for garbage elimination by converting food wastes to sewage. Learn how Jasper, Ind., eliminated garbage cans and collection nuisance with electrical disposal units by checking handy coupon. General Electric Co., Bridgeport 2, Conn.

STREETS AND HIGHWAYS

How the Mobil-Sweeper Can Improve Street Sweeping

23. Sweeping costs can be cut with the new Mobil-Sweeper which features safe highway speeds up to 25 mph, carries 2 2/3 cu. yd. dirt hopper, sweeps swath up to 10' wide with full floating brooms. Hills and deep gutters are no obstacle. Write to The Conveyor Co., 3260 E. Slauson Ave., Los Angeles 58, Calif. or use coupon for complete details on this machine.

Levels Sidewalks and Curbs Quickly and Easily

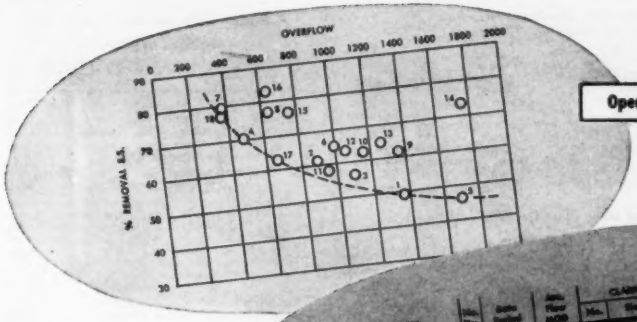
29. How the Mud-Jack Method for raising concrete curb, gutter, walls and streets solves problems of that kind quickly and economically without the usual cost of time-consuming reconstruction activities—a new bulletin by Koehring Company, 3026 W. Concordia Ave., Milwaukee 10, Wis.

Latest Bulletins on the Hough "Payloader"

167. Carrying dirt and backfill, loading snow, grading and bulldozing are a few of the many jobs quickly handled by public works departments that use Hough "Payloaders". Several models having bucket sizes from 12 cu. ft. to 1½ cu. yds. are offered. Check them all to see which is best suited for your jobs. The Frank G. Hough Co., 709 Sunnyside Ave., Libertyville, Ill.

Black-Top Paver Offers Many Advantages

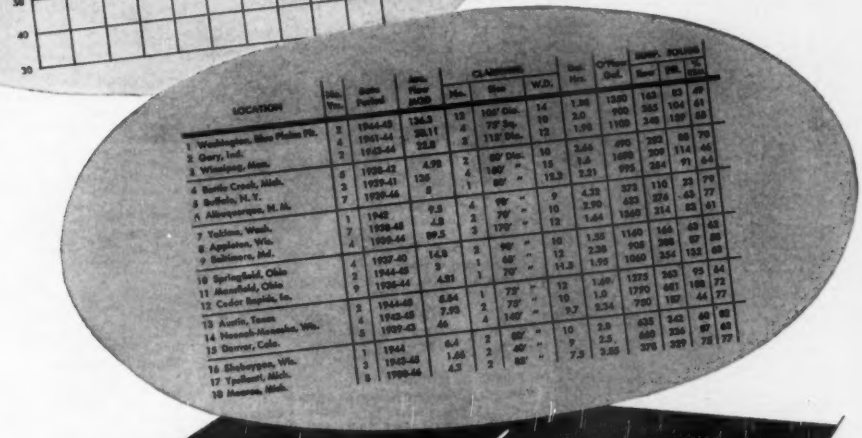
150. The flexible Adnun Black Top Paver lays any asphalt mix, hot or cold, in widths from 6 ft. to 13 ft. Careful design lowers operating cost and cuts maintenance. Attachments spread stone, cinders or slag. Get full data on this machine by checking coupon. The Foote Co., 1954 State St., Nunda, N. Y.



Operating Data on Dorr Sifeed Clarifiers—

radial flow—round or square units. Chart graphically illustrates results given in table below.

LOCATION	No. Yrs.	Date Period	Ave. Flow MGD	CLARIFIERS No.	CLARIFIERS Size	CLARIFIERS W.D.	Det. Hrs.	O'Flow Gal.	SUSP. SOLIDS Raw	SUSP. SOLIDS Eff.	SUSP. SOLIDS % Rem.
1 Washington, Blue Plains Pl.	2	1944-45	136.3	12	100' Dia.	14	1.86	1300	163	83	49
2 Gary, Ind.	4	1941-44	28.11	4	75' Sq.	10	2.0	900	365	164	61
3 Winnipeg, Man.	7	1945-44	25.8	3	115' Dia.	12	1.98	1100	248	109	55
4 Battle Creek, Mich.	6	1938-42	4.98	2	60' Dia.	10	2.66	490	285	88	70
5 Buffalo, N. Y.	3	1939-41	135	4	100' "	15	1.4	1600	309	114	46
6 Albuquerque, N. M.	7	1939-46	8	1	80' "	12.5	2.21	995	284	91	64
7 Yakima, Wash.	1	1942	9.5	4	90' "	9	4.32	373	116	33	72
8 Appleton, Wis.	7	1938-45	4.8	2	70' "	10	2.90	453	276	63	77
9 Baltimore, Md.	4	1940-44	89.5	3	170' "	12	1.64	1360	214	83	61
10 Springfield, Ohio	4	1937-40	14.0	2	90' "	10	1.55	1160	166	60	65
11 Mansfield, Ohio	2	1944-45	9	1	65' "	12	2.38	905	288	97	66
12 Cedar Rapids, Ia.	9	1936-44	4.91	1	70' "	14.3	1.95	1060	254	132	48
13 Austin, Texas	2	1944-45	6.84	1	75' "	12	1.69	1372	263	95	64
14 Neenah-Menasha, Wis.	4	1942-45	7.95	2	75' "	10	1.9	1790	661	188	72
15 Denver, Colo.	5	1939-43	46	4	140' "	9.7	2.34	700	187	44	77
16 Sheboygan, Wis.	1	1944	6.4	2	80' "	10	2.8	635	262	60	80
17 Ypsilanti, Mich.	3	1943-45	1.66	2	40' "	9	2.5	660	236	57	85
18 Monroe, Mich.	8	1938-46	4.5	2	80' "	7.5	3.85	378	329	78	77



A few moments' study of this graph and the supporting table will give you a clear idea of what kind of performance you can expect Dorr Clarifiers to deliver.

- ***These are long term records . . . obtained by competent plant chemists at well established installations. We believe they cannot be equaled.***
- ***Performance is one of the primary factors upon which Clarifier excellence should be judged. Are you getting the best?***

We'd like to give you some figures on Dorr Clarifier repair costs too. Ask a Dorr engineer for the facts.

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THE DORR COMPANY · ENGINEERS · STAMFORD, CONN.

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FOR REPAIRING BELL AND SPIGOT JOINT LEAKS...

SKINNER-SEAL
Bell Joint Clamp for stopping bell and spigot joint leaks under pressure. Gasket is completely sealed: at bell face by Monel Metal Seal band—at spigot by hard vulcanized gasket tip.

AND BROKEN MAINS

SKINNER-SEAL
Split Coupling Clamp. One man can install in 5 to 15 minutes. Gasket sealed by Monel band. Tested to 800 lbs. line pressure. A lasting repair. 2" to 16" incl.

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COMPANY
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Excellent Booklet Shows Aerial Mapping Technique

27. A clear explanation of the technique of aerial topographic map production is given in "Air Speeds Your Map Needs." Striking photographs trace aerial photos step-by-step to the final maps for highway location, city and regional zoning and planning, traffic studies, drainage and watershed projects, tax maps and many other types of work. Use the coupon to get this excellent booklet for public works and planning officials. Jack Ammann, Photogrammetric Engineers, 829 N. St. Mary's St., San Antonio 2, Texas.

Get Data Now On This Catch Basin Cleaner

34. Simple powerful pneumatic bucket is featured by Netco Catch Basin Cleaner. Folder 33A gives details and illustrates operation of complete self powered truck mounted unit. Netco Div., Clark-Wilcox Co., 118 Western Ave., Boston 34, Mass.

Open Steel Mesh Pavement for Bridges

72. A pavement that is self-cleaning, self-draining, light of weight, strong, durable, fireproof, economical and requires no maintenance, is described in a 24-page catalog by Irving Subway Grating Co., 5053 27th St., Long Island City 1, N. Y.

How to Save Time on Curb and Gutter Work

143. Every type of curb and gutter work is illustrated in the 12-page Heltzel catalog on steel forms for building concrete curbs, gutters and sidewalks. Time-saving setups show how to speed up the job and save money. Get your copy from Heltzel Steel Form & Iron Co., Dept., PW, Warren, Ohio.

Full Line of Plows Meets All Snow Removal Needs

242. Data issued by the Gledhill Co. covers the 22 standard snow plows available to meet all snow removal needs. Safety trip, foldback hoist and interchangeability are featured. Write Gledhill Road Machinery Co., Galion, Ohio, or use coupon.

SEWERAGE AND WASTE TREATMENT

What You Should Know About Trickling Filter Underdrains

20. Specifications for vitrified clay underdrain blocks conforming to ASTM standards, suggestions for layout and construction of trickling filter floors, dimensions of standard blocks, channel covers, angles and other fittings are available from the Trickling Filter Floor Institute, % Editor, Public Works, 310 E. 45th St., New York 17, N. Y. Check the coupon and we will forward your request.

How to Make Better Sewer Pipe Joints

37. How to make a better sewer pipe joint of cement—tight, minimizing root intrusion, better alignment of joint. Permits making joints in water-bearing trenches. General instructions issued by L. A. Weston Co., Dept. P.W., Adams, Mass.

A Handbook of Sewer Cleaning Equipment and Methods

46. A new, fully illustrated 40-page booklet shows every sewer cleaning operation with "Flexible" tools. Includes data on the fast and easily operated new Sewe RodeR and full engineers' specifications for power bucket machines. For your copy write Flexible Sewer Rod Equipment Co., 9059 Venice Blvd., Los Angeles 34, Calif.

How You Can Dispose Of Sewage Solids

54. Nichols Herreshoff incinerator for complete disposal of sewage solids and industrial wastes—a new booklet illustrates and explains how this Nichols incinerator works. Pictures recent installations. Write Dept. PW, Nichols Engineering and Research Corp., 70 Pine St., New York 5, N. Y.

Odorless Sanitary Septic Tank Cleaning

88. The Gorman-Rupp Odorless Sanitary Cleaning unit combines centrifugal self-priming pump, air-cooled engine and oval tank on a sturdy frame. For full description of this adaptable unit get bulletin 7-ST-11. Gorman-Rupp Co., 120 N. Bowman Ave., Mansfield, Ohio.

Using Sewage Sludge Gas For Power Generation

90. Faribanks-Morse dual fuel engines can operate on either sludge gas or oil to provide steady power output despite fluctuations in gas supply. Bulletins are available on several sizes to meet your needs. Write, giving exact requirements to Fairbanks, Morse & Co., Dept. PW, 600 So. Michigan Ave., Chicago 5, Ill., or use handy coupon.

How Cities Can Do Complete Sewer Cleaning From Street

98. Literature illustrating how cities, towns and villages using OK Champion Sewer Cleaners are doing a complete sewer cleaning job from street level. Power machines available in addition to full line of sewer rods and accessories. Issued by Champion Corporation, 4752 Sheffield Avenue, Hammond, Indiana.

Need Low-Cost Air For Sewage Treatment?

122. New 20-page booklet shows operating and construction features of Rotary Positive Blowers engineered to fit your needs. Air for activated sludge, water treatment; constant vacuum for filtering. Bulletin 22-23-B-13 gives details. Roots-Connersville Blower Corp., 510 Poplar Ave., Connersville, Ind.

Engineering Data on Digester Heating

128. An excellent 32-page bulletin covering all features of the PFT External Heater and Heat Exchanger unit discusses effective digester heating, size of heater and exchanger, space requirements, building heating, and related items. Curves and tables provide full data for the designer. Check the coupon for your copy of this comprehensive bulletin, No. 235. Pacific Flush-Tank Co., 4241 Ravenswood Ave., Chicago 13, Ill.

Comminutors for Automatic Disposal of Coarse Sewage Solids

152. The problems connected with disposal of coarse sewage solids are eliminated by clean, odorless, automatic Comminutors. Full engineering data show the proper model for every size plant and furnish details of hydraulics and typical installations. Chicago Pump Co., 2348 Wolfram St., Chicago 18, Ill.

Fast and Easy to Handle Sewer Cleaning Machine

180. Get full details on the Sewer-Scooter for which sewage furnishes the operating power and which is operated entirely from street level. Bulletin on these time-saving machines available from Fitzgerald Engineering Co., Inc., P. O. Box 289, Coral Gables, 34, Fla., or by using coupon.

Complete Catalog for Engineers Shows Water and Sewage Plant Equipment

191. The complete line of Jeffrey equipment for treatment of water, sewage and industrial wastes is covered in 52-page Catalog 833. Detailed information is provided on bar screens, grinders, grit collectors, "Jigrit" washers, sludge collectors, feeders, conveyors and other related units. Photos and drawings of installations plus capacity tables complete this valuable booklet. Use coupon or write Jeffrey Mfg. Co., 947 N. 4th St., Columbus 16, Ohio.

Low Cost Power From Dual Fuel Engines

154. Operating on the Diesel cycle, burning either oil or gas, the Worthington Supercharged Dual Fuel Diesels give high economies by running on the cheapest fuel available. Get complete data from Worthington Pump & Machinery Corp., Dept. PW, Harrison, N. J.

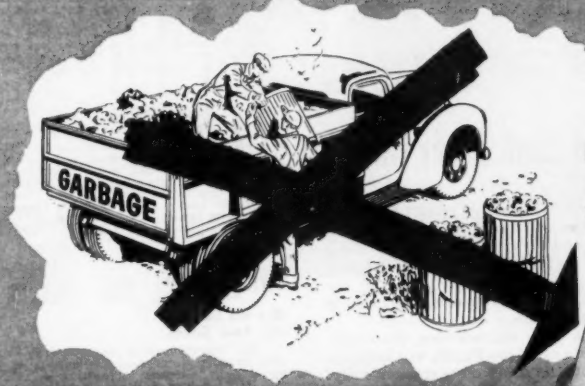
Data on Scum Removal For Primary Tanks

172. Send for Bulletin S 6000, published by Infilco Inc., for all the interesting facts concerning automatic hydraulic removal of scum from primary sewage sedimentation tanks by controlled currents. The same bulletin furnishes complete information on sedimentation and sludge removal. Write Infilco Inc., Box 5033, Tucson, Ariz., or use coupon.

Check Coupon on page 26 to order this FREE EQUIPMENT DATA

Modern Communities Everywhere are Investigating...

Hotpoint's Municipal Plan of Food-Waste Disposal

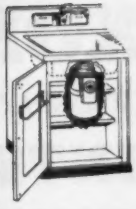


"CAN AND WAGON" GARBAGE COLLECTION SYSTEM BEING ABANDONED!

Progressive civic officials all over the country are getting the facts concerning the many advantages offered in Hotpoint's Municipal Plan of Food-Waste Disposal. Documented reports from modern communities, where the "can and wagon" garbage collection system has been abandoned, prove the benefits which accrue under the Hotpoint Plan.

If you would like to provide your community with a modern, sanitary, economical way of disposing of food-waste before it becomes garbage—and with all the added advantages listed below—Hotpoint will gladly present the whole story of its Municipal Plan. It's based on experience and written specifically for municipal officials.

- A convenient, new and modern food-waste removal system.
- Health protection to the members of all families.
- Fly and rat pest reduction.
- Garbage collection cost reduction.
- More digester gas for use and sale.
- More digested sludge for fertilizer.
- Elimination of food-waste before it becomes garbage.
- Elimination of alley garbage can.
- Elimination of garbage collection problems.
- Elimination of garbage odors.
- True sanitation for your town.



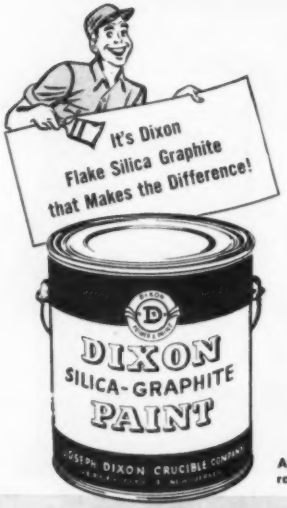
The Hotpoint Disposall® food-waste disposer is easy to install in any sink . . . convenient . . . safe . . . odorless and economical. Simple to operate . . . keeps kitchens, sinks and hands clean. Does not overload or clog sewer systems. Can also be used with septic tank.

And . . . it saves you money!

Write to Hotpoint Disposall Dept.
5600 West Taylor St., Chicago 44, Illinois, for all the facts

Hotpoint Inc.
(A General Electric Affiliate)
5600 West Taylor Street, Chicago 44, Illinois

8 to 15 years paint life on tank after tank!



Yes, 8 to 15 years of paint life are not at all uncommon . . . when water tanks are painted with Dixon *Flake* Silica Graphite Paint! Actual service records prove this. That's why many of the largest private water companies *always* specify Dixon.

With costs skyrocketing, the *extra-long* life of Dixon Paints will help you cut your painting costs tremendously.

Why are Dixon Paints so enduring?

It's Dixon *Natural* Flake Silica Graphite that makes the difference . . . that gives Dixon Paints the time-proved ability to protect outdoor structures against punishing weather and atmospheric conditions!

Many other uses

Bridges — Stadia — Smoke Stacks — Lighting and Traffic Equipment — and all other Outside Structures.

Available in a wide range of colors.

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Paint Division, Jersey City 3, N. J., Dept. 8P
Please send me ☐ Water Tank Painting Bulletin ☐ Contract forms and specifications for water tank painting ☐ I'm also interested in the painting of_____ ☐ Have your representative call.

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CITY_____STATE_____

SPECIALISTS IN OUTDOOR PROTECTIVE PAINTS—FOR ALMOST A CENTURY.

Check Coupon on page 26 to order this FREE EQUIPMENT DATA

Data on Design of Grit Collectors and Washers

202. Grit collection and separation of organic materials from settled grit is described in Link-Belt Bulletin 1942. Typical installations are shown, and design data is provided, together with specifications. Use coupon for copy, or write Link-Belt Co., 2045 W. Hunting Park Ave., Philadelphia 40, Pa.

General Catalog on Measuring and Controlling Equipment

272. The full line of Simplex equipment for the measurement and control of liquids and gases in water and sewage plant installations is illustrated and described in detail in 28-page Catalog 002. Every engineer should study the design data in this helpful booklet. Write Simplex Valve & Meter Co., 68th & Upland Sts., Philadelphia 42, Pa., or use the coupon.

How to Dispose of Sewage and Industrial Sludges

281. Get full information on the C. E. Raymond System of combined incineration and sludge drying providing high temperature deodorizing for nuisance-free sludge disposal. Flexible layouts fit large and small communities. Use handy coupon or write Combustion Engineering-Superheater, Inc., Flash Dryer Div., 200 Madison Ave., New York 16, N. Y.

CIVIL DEFENSE

Get the Facts on Air Raid Sirens

86. There's more to be considered in air raid warning sirens than the loudness of the signal. Get complete information on efficient size and spacing of sirens from Federal Enterprises, Inc., 8733 So. State St., Chicago, Ill., by using coupon.

Air Cooled Engines for Hundreds of Applications

137. Tested under severest conditions of long, hard use, these engines have earned world wide recognition as the "right" power for hundreds of applications. Get latest bulletin from Dept. PW, Briggs and Stratton Corp., Milwaukee 1, Wisc.

Protection Against Power Failure

169. Data on stationary, portable, and standby electric plants, AC and DC, are offered by D. W. Onan & Sons, Inc., 7655 University Ave., Minneapolis 5, Minn. Several bulletins cover diesel and gasoline-driven plants for every purpose. Just check the coupon for your copies.

Emergency Water Supply and Treatment

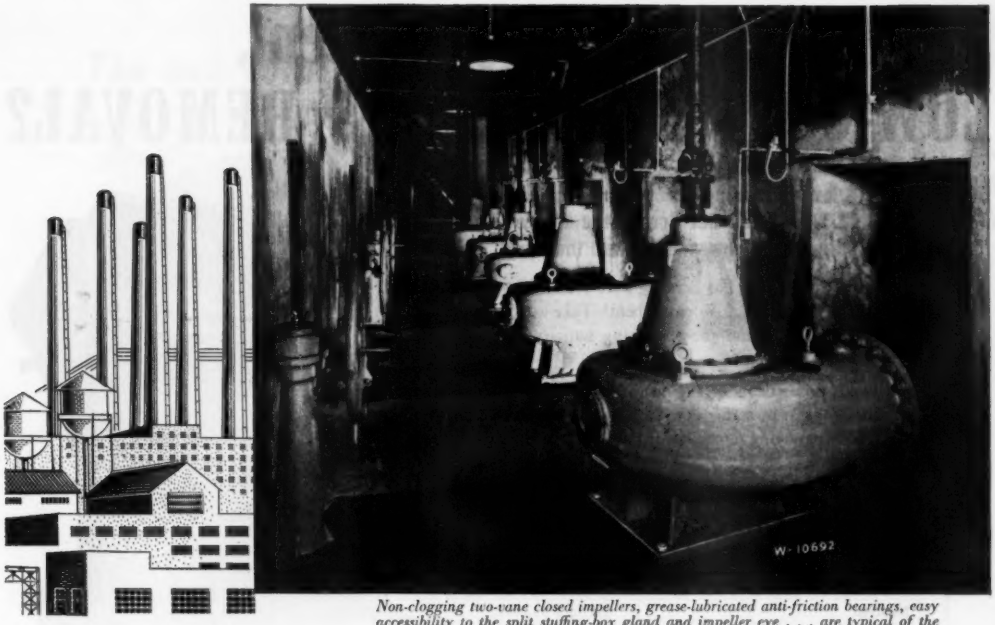
184. The mobile Pur-O-Pumper diatomite filter and portable dual drive hypochlorinator, both supplied by Proportioneers, Inc., team up for emergency water supply treatment. Pump and diatomite filter with 50 gpm capacity are trailer mounted, gasoline operated. Get all the facts from Proportioneers, Inc., 356 Harris Ave., Providence 1, R. I., or use coupon.

Electric Equipment For Rescue Work

185. Homelite Carryable gasoline-engine-driven generators will supply light in all emergencies and plenty of power to operate the self-priming pumps, blowers and chain saws used by rescue teams. Get full data on these units by checking connon or write Homelite, Inc., Dept. PW, 2108 Riverdale Ave., Port Chester, N. Y.

Emergency Repairs For Damaged Lines

240. Six safe, sure ways for quick repair of damaged lines with Dresser couplings and repair products are outlined by Dresser Mfg. Div., 59 Fisher Ave., Bradford, Pa. Prepare for emergencies by getting full data now. Use the coupon.



Non-clogging two-vane closed impellers, grease-lubricated anti-friction bearings, easy accessibility to the split stuffing-box gland and impeller eye . . . are typical of the many Worthington MIXFLO *features assuring low-cost, trouble-free sewage pumping.*

How is Bridgeport's Sewage Pumped?

It's full of industrial waste . . . a problem built for Worthington Pumps

Here's another municipality which has turned its sewage pumping over to Worthington—100%.

These five Worthington Vertical MIXFLO sewage pumps are located in Bridgeport's Westside sewage plant—installed in 1946. Three are 20-inch, two are 16-inch MIXFLOS.

Bridgeport's Eastside plant duplicates these five pumps, and in addition uses two Worthington dry vacuum pumps and a Worthington air compressor.

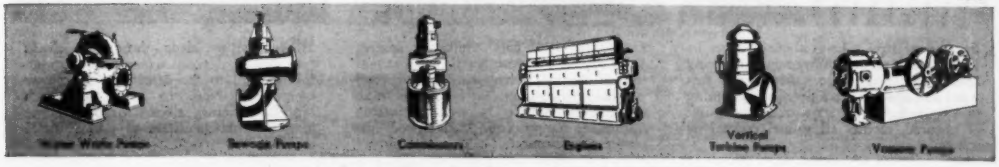
In many other places, too, Worthington—world's largest manufacturer of pumps—is keeping pace with developments in sewage treatment and disposal by furnishing pumps of utmost dependability.

The Worthington MIXFLO line offers the industry's widest choice of sizes and types. So take a tip from New York, Chicago, Philadelphia, Bridgeport—find out why *there's more worth in Worthington*. Write Worthington Pump and Machinery Corporation, Public Works Division, Harrison, New Jersey.

WORTHINGTON

SEWAGE PUMPS

W.1.1



Now's the time to mail this month's Readers' Service card.

Looking for efficient, LOW-COST SCREENINGS REMOVAL?

Immediate, overwhelming acceptance proves new LINK-BELT Thru-Clean Bar Screen the answer for handling screenings from sewage and industrial wastes

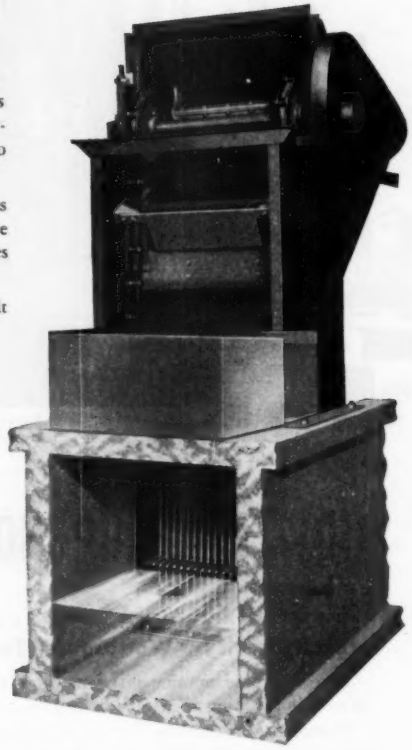
YES, 36 new Thru-Clean Bar Screens were sold in the 12 months following Link-Belt's initial announcement! Take a look at the partial list of installations and the consulting sanitary engineers who were responsible for them.

Then look at the advanced engineering illustrated by the photos below. They suggest how this new Link-Belt development can solve the problem of removing screenings from sewage or industrial wastes in your plant.

You can get the complete story by calling your nearest Link-Belt office. Or write for Folder No. 2327.

A FEW USERS OF THRU-CLEAN BAR SCREENS

Location	*Sanitary Engineer*
Nassau County, N. Y.	Greeley & Hansen
Union Grove, Wis.	W. G. Hirchoffer
Port Huron, Mich.	Drury, McNamee & Porter
Idabel, Okla.	Collins Engineering
Storm Lake, Iowa	Buell & Winters
Camden, N. J.	Havens & Emerson
Rochester, Minn.	Toltz, King & Day

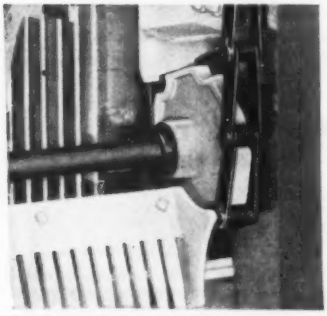


LINK-BELT

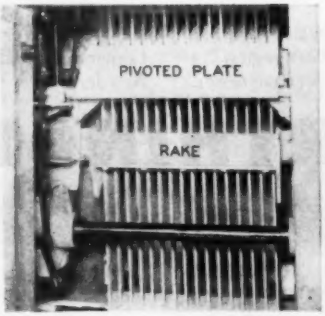
SANITARY ENGINEERING EQUIPMENT

LINK-BELT COMPANY: Philadelphia 40, Chicago 9, Indianapolis 6, Atlanta, Houston 1, Minneapolis 5, San Francisco 24, Los Angeles 33, Seattle 4, Toronto 8, Springs (South Africa). Offices in principal cities. 12,310

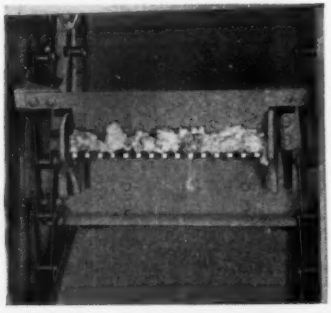
How rakes automatically clean bars "from the back"



Segmented steel rake is about to start its low-friction vertical movement. Entering from downstream side (*shown*), its forward and upward force precludes jamming or clogging. Travel starts at lowest point of channel, catches all solids retained by screen.



Cold-rolled steel bars, uniformly spaced, form screen. They are rigidly fixed at bottom of channel, extend only 6 in. beyond pivoted plate immediately above high water level. Simple, rugged construction minimizes maintenance. Low speed cuts power consumption.



Hinged wiper blade thoroughly cleans rake fingers, deposits screenings in trough for removal to shredder, disposal can or incinerator. Note the heavy, long-pitch Link-Belt chains, selected for trouble-free long life and assurance of proper travel for rakes.

Need more facts about advertised products? Mail your Reader's Service card now.

The one sure way to have ROCK SALT *this winter . . .* STORE IT UNDER SENSATIONAL NEW RAYN-SHED

NOW you can order your Rock Salt months ahead and keep it well protected until you are ready to use it.

Pile your Rock Salt on any hardened surface—such as an abandoned strip of road, or on tar paper—then cover it easily and quickly with RAYN-SHED.

WHAT IS RAYN-SHED?

RAYN-SHED is a durable, watertight, weather-resistant vinylite plastic sheet, carefully sewed into large strips, which in turn may be cemented together on the job to form even larger coverings as your salt pile grows. Sizes are standardized, so that easily made combinations will cover bulk salt piles of 2 to 20 carloads. RAYN-SHED is equally suitable to use over piles of bag salt.

RAYN-SHED IS ECONOMICAL

RAYN-SHED coverage costs about 30-65c per ton, according to the size and shape of the pile. Costing less than virtually any other type of storage protection, it's so thrifty you can afford to discard it if you wish after a single season.

SAVE BY STOCKPILING EARLY

Many cities and towns paid substantial premiums for emergency deliveries of salt last winter—several times the low cost of RAYN-SHED. No one can honestly promise you wintertime deliveries when you need them. Early stockpiling is the only sound answer. RAYN-SHED makes early stockpiling practicable.

Write for DATA SHEET for estimating sizes of RAYN-SHED Vinylite Covers for Cayuga Rock Salt storage.

Rayn-Shed is developed by and is available through the Chemical Corp. of Springfield, Mass.

CAYUGA ROCK SALT CO., INC., MYERS, N.Y.

SIZES FOR ALL PURPOSES *Call Nearest Distributor* **BULK OR BAGS**

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Telephone Groton 194
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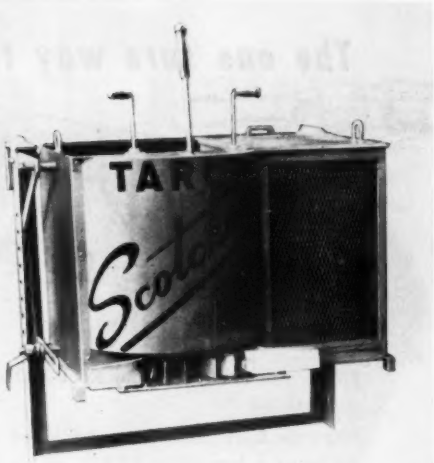
12 Mercer Ave., Chatham, N. J.
Telephone Chatham 4-7608

It's a fact . . . our handy Readers' Service card is the easy way to get new catalogs.

SAVE 1/2 THE SALT

GAIN 8 TIMES THE SPEED

. . . WITH A TARCO "SCOTCHMAN"



NO SAND OR CINDERS NEEDED

City after city—county after county—report the same satisfactions and savings from standardizing on the Tarco "Scotchman" for ice control on winter pavements.

They treat up to 20 miles of highway in 48 minutes; skid-proof 30 city blocks in 7 or 8 minutes.

Salt alone — properly applied the thrifty "Scotchman" way—does the job. No cost, time-loss, or after-mess from using abrasives.

HOW THE "SCOTCHMAN" SAVES AS IT SALTS:

"Scotchman" equipped with safety platform handling bulk salt.

1. **8 TIMES FASTER** than using unneeded sand or cinders.
2. **LESS LABOR.** No rehandling of abrasives. No messy street sweeping and catch basin cleaning next spring.
3. **LESS TIME.** Hook up a "Scotchman" to your truck in 3 minutes. Remove it in less.
4. **LESS MATERIALS.** The "Scotchman" spreads the minimum of salt in a perfect "bird shot" pattern. 400 to 500 lbs. treats a mile of paving.
5. **LESS MAINTENANCE EQUIPMENT.** Saves on blades, gas, chains. No graders needed to scarify anchor ice away.
6. **COMPLETE, ACCURATE CONTROLS.** Instant control of width and direction. No salt on dry pavement. Pick your shots and spots.

Weather-proofed engine operates in filtered air. All vital parts are stainless steel. Push button starter, dual-purpose lights if desired. It costs more NOT to own a "Scotchman." For details, address *today:*

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100 Jumel Place Saratoga Springs, N. Y.

Get full details of this month's products . . . mail your Readers' Service card today.

PUBLIC WORKS
Magazine

VOLUME 82 ● NO. 8 **AUGUST 1951**

BETTER ICE CONTROL *with* ROCK SALT

ARTHUR L. DEMAREST
VILLAGE ENGINEER
So. Orange, N. J.

THE Street Department of South Orange, N. J., began using salt exclusively for treatment of icy pavements in the 1949-1950 season. Former procedure consisted of the application of ⅜-inch crushed stone with the addition of sufficient rock salt for the purpose of anchoring the stone in the ice.

● ***SALT spreader ready to go.***

After nearly two full seasons of applying rock salt without abrasives it has been found that the use of rock salt exclusively is very effective. We are no longer confronted with the disagreeable and time consuming task of spring cleaning many miles of streets cluttered with dirty and dusty stone; also, the nuisance of sewers becoming obstructed with crushed stone washed into them from heavy rains will soon be a thing of the past. In addition, traffic safety has been promoted.

The Department acquired its first salt spreader in December, 1949. This was used to supplement hand spreading. Our initial effort was in the nature of an experiment but proved to be so satisfactory that it was decided to operate on a permanent basis and two more salt spreaders were purchased in October, 1950. The first machine cost $485 and the second two cost $540 each.

A fourth salt spreader of the same make was purchased in January, 1951, at a cost of $550. All four machines are Tarco "Scotchman" salt spreaders, and were purchased from Johnson and Dealaman, Inc., Newark, N. J.

Spreading the Salt

The machines are attached to the rear of a truck which we load by hand with bags of rock salt. The four spreaders are used on three Street Department trucks and one Park Department truck. In addition to the truck drivers two men are required to operate the spreader—one to feed salt and one to regulate the spreader. We also have two shop men for first echelon maintenance and the entire program is managed by a supervisor who is in full charge of all winter operations.

The Village is divided into five districts involving a total of about 23.75 miles of roads. The roads included are those having grades which may prove difficult to motorists, all arterial highway routes, and traffic signalized intersections. There is a total of 40 miles of roads, exclusive of County roads, in the Village. The present program, though it is limited to 23.75 miles, has proved to be economical and satisfactory. Expansion to include all 40 miles is not contemplated at the present time but will be the subject of further study from the standpoint of operation, economy and necessity.

Our chief problem at present is the matter of salt storage space. Salt is purchased in bags, delivered by freight at the Main Pumping Station and loaded on Village trucks which cart it from there to the Service Building in Trenchard Place; or Village trucks cart it from Newark when necessary. We are now paying about $19 per ton for salt. The Service Building has limited storage space and can accommodate about 25 tons which amounts to 500 bags of 100 pounds each. Storage space for about 100 tons should be minimum requirements and if this were all purchased in the summer it would be more economical in providing a complete winter supply, with a sufficient reserve on hand for emergencies Time lost in carting salt would be avoided and standards of service could be improved.

Amount of Salt Used

During the 1949-1950 season a total of 67.5 tons of salt was con-

sumed but this was a mild winter with practically no snow and few ice storms. During the 1950-1951 season 80 tons of salt were purchased of which amount 70 tons have been used thus far for ice control.

The amount of salt used annually will vary with the number and intensity of storms while the amount used per storm will vary according to the character of the storm, labor and equipment needed, and the mileage treated. For example, the storm on Sunday, Jan. 28, 1950 was an average storm consisting of a light freezing rain with no snow. Operations took four hours, starting at 3:30 P.M., and were completed at 7:30 P.M. Four trucks with drivers, 8 helpers, 2 shop men, and 1 supervisor were in service. Eleven tons of rock salt were spread and at $19.20 per ton the total cost for salt was $211.20.

This is our second season in which we have used rock salt for treatment of icy pavements but we feel that there is still much to learn about this method insofar as all phases are concerned. It has been very effective but it is still too early to determine just what effect it has on our pavements, vehicles, and other property. We intend to continue the use of salt and at the same time closely observe and study its effects so that we may fully understand all of its advantages and disadvantages and make improvements where needed.

● ***SIDE view of truck with Tarco spreader attached. Salt is fed to spreader by a 2-man crew from bags loaded on the truck.***

● ***TRUCK loaded with salt is ready to start out on salting operations. Use of salt has resulted in economy and satisfaction.***

Colored, Heavy and Light Weight Concrete

In building the Alemany Overpass in San Francisco, a colored (light terracotta) concrete was used. Experimenting was necessary to obtain the desired color, this being done on footings which were later covered. The mixing of the pigments with the concrete offered some problems. The central mixing plant objected to running the colored concrete through the plant since it would be difficult and expensive to clean the plant following each color run thoroughly enough to avoid getting color into concrete mixed for others.

For this reason, mixing of the color into the concrete was done in transit-mix trucks. The color was added first at the bottom of the batch, and then in the middle, but neither gave even distribution. Finally it was added to the top of the load after the full concrete batch had been discharged into the truck. This method gave the most even dispersion of color, but required close inspection because some trucks did not mix as thoroughly as others. Some variations in color have appeared on the finished surfaces due to differences in the texture of the plywood forms, but this could probably be overcome by blasting.

The counterweights for the Islais Creek bridge required concrete weighing 217 and 224 pounds per cubic ft. The requirements were met by using mangetite iron ore as the aggregate with six sacks of cement per yard. Spacer blocks for sewage treatment effluent lines, where light weight concrete was needed, were made with "Haydite" aggregate, which gave an average weight of 105 pounds per cu. ft.

Canning Plant Lagoon Loading

An anaerobic lagoon used by a corn canning plant was loaded with 12½ pounds of BOD per 1,000 cubic feet of lagoon. There was a reduction of 56% in BOD with a detention period of 11.3 days.—Purdue Sanitary Engineering News.

LABOR SAVING EQUIPMENT—*Pays Off*

ABOUT four years ago, after much discussion, arguing and almost pleading, our Water Department received the green light to pioneer a new type of labor saving equipment as far as the City of Watertown was concerned. We purchased a Lull Shoveloader on an Oliver 80 Tractor. We have never been sorry.

Many types of shoveloaders and dozer loaders were examined, mostly by literature and advertisements in magazines. Dozer loaders were ruled out because of the possible damage to macadam streets from the treads or the necessity of transporting them on a trailer. Something on wheels seemed to be what we wanted in order that we could get from one part of the city to another with the least amount of lost time. Some shoveloaders had a straight vertical lift on the bucket but that meant the tractor had to be in close proximity to the pile of material being loaded which in our case was usually alongside a trench where the weight of a tractor might cause a cave-in. Other types had a rope or chain manual trip for dumping the bucket. We decided an hydraulically operated dump gave much better control to the operator. Finally we came down to the "Lull"—15 to 18 mph. about the city, rubber mounted, hydraulically operated bucket, and operating arms attached to the back of the bucket where a minimum of dirt is encountered. It had a ⅝-cubic yard bucket for normal operation and 2-yard bucket for handling snow. This was what we had been looking for. Our work consists mainly of water services and water main installation. On all service trenches through pavements the excavating material is hauled away and replaced with gravel. Loading of this excavated material with a shoveloader was to be its main job.

The day after our loader arrived we made very good use of it. A leak had developed in a war-time substitute service at the main which at this point was over eight feet deep due to passing under a storm water sewer. There was no way to shut the leak off without shutting off the main and depriving two city blocks of water so we dug it up with the water on. The installation was only about five years old and consequently the original backfill of earth was not too well consolidated and our excavated material was of that consistency that is almost too thin to shovel but too thick to bail. After repairing the leak we loaded the "soup" onto a truck with our shovel loader in less than a tenth of the time it would have taken two men to shovel it onto the truck.

● *"OPERATING without this loader would be going back to the horse and buggy days."*

In normal operation our loader can take care of at least four service jobs in one day even though they be scattered anywhere about the city. On main installations we can backfill several hundred feet of trench in a day and load the surplus without interrupting the laying organizations.

Many other uses have developed and hardly a season goes by without a new use being thought up. With a chain around the bucket, it becomes a crane to lift a length of cast iron pipe, a fitting made up on the bank and dropped in place in the ditch, a large gate valve lowered into place, or a hydrant held in position until the joints have been made up. It has lifted a 75 H.P. motor and swung it off a dam and dropped it seven feet onto a platform and followed it with a 12-inch pump and pulley mounted on a bed plate.

With the large bucket on in the winter, it becomes a snow mover. The only place we have to keep our shoveloader inside is at our pump house which is located on the eastern edge of the city and, during a real winter storm, used to be isolated for several days as far as driving into the yard with an automobile was concerned. Now our pump house operators on the night shift get the shoveloader out and have the driveways cleared out by the time the day shift arrives. One morning, after a particularly wild and stormy night, our filter plant foreman, who has been with us over 35 years, came to work and found the drives all cleaned out. He remarked, "I never thought I would live to see this."

A few winters ago we had another bad storm of three days duration and before it ended not a fire hydrant could be seen. It seemed a tremendous task to dig out the 575 hydrants on our system. However, we put the small bucket on the loader and went to work together with two hand crews and in three days time practically every hydrant was available to the fire department.

Our loader became so popular with the Public Works Department and was rented to them so often when we had no use for it that they finally purchased a similar but heavier type themselves. Various contractors around the city have also rented it when available.

To have to operate without our loader now would put us back in the horse and buggy age. Having had such success with this piece of equipment we are now intrigued with the "Oliver-Ware Hydro-Trencher" which looks like a perfect running mate to the Shoveloader.

THOMAS B. TYLDESLEY

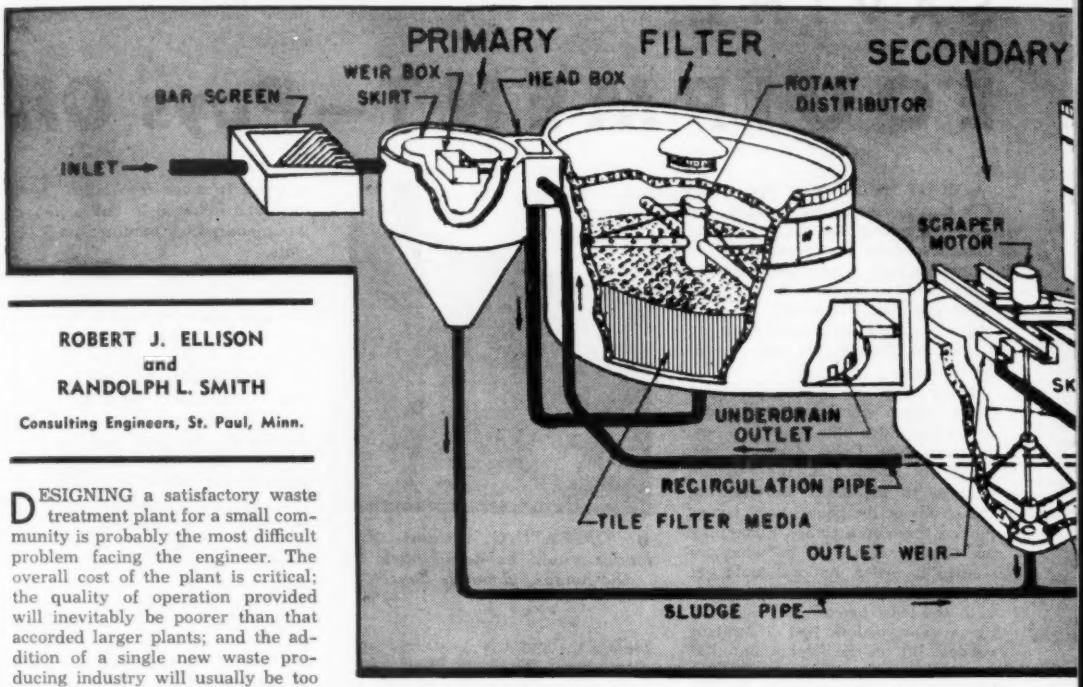
Supt. of Water, Watertown, N. Y.

UNUSUAL DESIGN for SMALL

ROBERT J. ELLISON
and
RANDOLPH L. SMITH
Consulting Engineers, St. Paul, Minn.

DESIGNING a satisfactory waste treatment plant for a small community is probably the most difficult problem facing the engineer. The overall cost of the plant is critical; the quality of operation provided will inevitably be poorer than that accorded larger plants; and the addition of a single new waste producing industry will usually be too much for the plant to handle without a breakdown in treatment. The Imhoff tank has helped, and the "package" type plants have done their part in solving this problem; but the financing difficulties of the small communities have, in many cases, resulted in a compromise and the use of primary treatment where complete treatment was indicated.

Onamia is a typical small Minnesota community. It has a population of about 700, with a small creamery and minor poultry and animal killing contributing industrial wastes. The degree of treatment required involved removal of about 85% of the organic material. The design of the plant includes two features that are not generally used: First, an extremely small primary settling tank; and, second, chemical treatment of sludge rather than digestion. The use of these two methods of treatment permitted a plant cost for complete treatment approximately the same as the cost of primary treatment using settling and separate sludge digestion.



● *SCHEMATIC layout of plant showing small primary, covered filter*

The actual peak flow is approximately 125 gpm. It was decided to base design on 200 gpm for three reasons: First, to provide a 20-year basis for financing the plant; second, to provide for the possibility of an additional small waste producing industry; and, third, because of the small extra initial cost. Only two plant units had to be increased in size and, in terms of plant cost, the overall increase was about 10%.

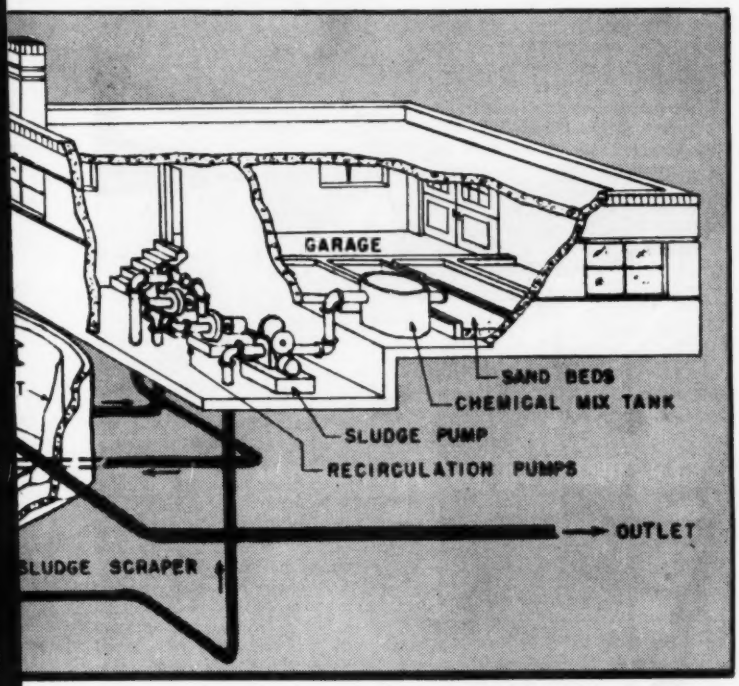
Primary Treatment

The primary tank used is an unmechanized Spiraflo settling tank 12 ft. in diameter, with a skirt extending 10 ft. below the surface. The deep skirt requires the passage of the waste under the full periphery of the baffle and means minimum velocities of flow and minimum carryover of solid matter. The background bases for this design were as follows:

Quite a number of treatment plants incorporating a self-cleaning fine screen for primary treatment have been constructed and operated for periods up to 15 years in this part of the country. The reason for this use of a fine screen has been the sounder biology in the treatment of milk and animal killing wastes as well as the economy involved. These years of operation have shown that overall plant treatment will be the same whether a fine screen or long-term primary settling is used. This conclusion is part of the standards of the Upper Mississippi River Group.

The argument is sometimes advanced that long-term settling will produce a more uniform sludge. Actually, the longer the settling time, the more sludge will be removed and the less uniform this sludge will be. A short-term settling tank or a 10-mesh screen will remove only that portion of the solids which tend to clog the filter. The balance of the settleable solids, being trapped in the microbial forest of

WASTE TREATMENT PLANT



recirculation piping and covered sludge beds in operating building.

the filter flora and released as a part of the sloughed flora, will produce a relatively constant type of sludge.

Filter slough, resembling jello in consistency, should not be pumped at a high velocity since this breaks it up into finely divided material which is hard to remove from the liquid. Because of economics, the customary procedure in a plant with a large primary tank, has been to recirculate directly from the filter effluent to the primary tank influent. The filter slough is mostly anaerobic and when passed again through the filter causes accelerated additional loss of filter flora.

With long-term storage in a large primary tank, these solids tend to return to solution. In case of the dumping of sour milk, the filter is the alkalizing agent, not the settling tank, and the quicker the liquid reaches the filter, the quicker the plant becomes alkaline. A filter that is self-cleaning, such as tile filter media, is better prepared to handle the problem of deposited casein than a primary tank. A large primary settling tank cannot be considered a better diluting agent than a large final tank with the return of the recirculated liquor to the filter influent. A settling tank does not function like a quick mix.

It is therefore believed that the primary tank should be sufficiently large to remove only that material which would plug the filter and is too large to be treated by the microbial forest of the filter flora. The critical material, from the settling consideration, is feathers. Some will float; others will sink; and some will acquire practically the same specific gravity as the liquid. The unmechanized tank with the deep skirt meets this situation best.

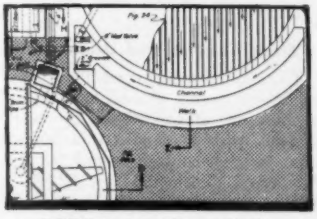
Secondary Treatment

The short primary settling period, plus the presence of concentrated milk and blood wastes, emphasizes the importance of a filter media with the maximum self-cleaning ability to eliminate the effects of deposited casein, and capable of producing a reasonably constant type of sludge. Prefabricated tile media, with the aerofilter, was selected as most likely to produce the best treatment.

The final settling tank is of the Spiraflo type. An economy was obtained by taking the recirculation liquor from the area outside the skirt, leaving only the final effluent passing over the center weirs. The size of the surface area was calculated on providing an overflow rate of 800 gallons per square foot of surface inside the skirt for the total daily flow leaving the plant. The skirt extends 9 ft. below the surface and was placed at such distance from the wall as to maintain a maximum velocity of 3 ft. per minute in the race or feed channel.

Sludge Disposal

The choice for sludge disposal lay between chemical treatment and digestion. The cost for chemical treatment, considering principal, interest, upkeep, chemicals and obsolescence, was about one-half the cost of digestion. The chemical method also had the advantage of treating milk and blood wastes without difficulty, while providing greater flexibility. The method used is as follows: The sludge is pumped to a 400-gal. concrete tank where anhydrous ferric chloride is added at the rate of 2 pounds per 100 gals. of sludge; after stirring with a quick-mix for 20 seconds, the sludge is passed to sand beds for dewatering, which is accomplished in a few hours. The sludge is odorless unless piled outside—it must be spread in thin layers on the ground.



● ***DETAIL of filter discharge.***

PHILADELPHIA'S

THE Philadelphia City Planning Commission, of which Edward Hopkinson, Jr., is chairman, has issued its program for public improvements for the 6-year period, 1951 through 1956. Those portions of it relating to sewerage, drainage, water supply, refuse disposal, streets, airports and bridges are summarized herewith.

Expenditures required to complete three large sewage treatment plants are scheduled, as well as funds for intercepting sewers to collect all of the city's sewage and convey it to these works. This vast program is expected to be completed within the first three years of the six-year program. It will constitute the city's share in the statewide and nationwide effort to abate stream pollution. An important step in this program will be passed with the completion of the new Northeast Treatment Works. Two other large plants—the Southwest and the Southeast—are already under construction. The total scheduled expenditure for sewage treatment is $5,636,000 and it is expected that the last contracts will be awarded in 1952.

In addition to seventeen projects for intercepting sewers, estimated to cost $21,312,600, a large program of sewer extension is planned. Though thousands of homes have been built in Philadelphia recently, the need for new homes is still great. It is estimated that $15,000,000 must be spent during the next six years for providing sewerage facilities to areas now being developed or likely to be developed. Also, there are some built-up areas in the city that are still without sewers, and service for these will cost an estimated $6,000,000. Some of the existing sewers are old and must be rebuilt, and for this purpose an expenditure of $7,500,000 is proposed during the six-year period.

Flood Control and Drainage

To relieve flooding conditions during heavy storms, at least eight supplementary storm-water drainage systems will be required in addition to the control works along Frankford Creek. So far, $2,190,000 has been spent on the Frankford Creek project and an additional $4,180,000 will be required to complete the work. Nearly $21,000,000 will be necessary to construct the eight other projects that are needed. It has not been possible to allocate sufficient funds to complete this work during the six-year planning period, but $12,500,000 is recommended for flood relief work.

● *PORTION of Vine Street widening between 6th and 18th Streets.*

In southwest Philadelphia are several hundred acres which cannot now be used because of inadequate drainage. A program is being started to recapture the values of this ground and to make it usable for residential and industrial development. Consultants are being employed to determine the requirements for drainage and for filling low areas as well as the possibility for building in this section.

Water Supply; Refuse Disposal

Although much has already been accomplished toward rehabilitating and extending the city's water system, work totalling an estimated $37,811,000 is proposed for the next six years. For extending the mains to serve new homes and to strengthen the distribution system generally, about $9,000,000 will be required. For work at the filter plants and pumping stations, $23,761,000 will be required. It is recommended that all water services be metered, and an initial $1,000,000 has been allocated for starting the installation of meters, but this amount is expected to be recovered by charges to the consumers. The total estimated cost of this project is $6,050,000, of which $5,050,000 is scheduled beginning in 1952.

Refuse disposal constitutes one of the city's most urgent problems. For many years, ashes, rubbish and other non-combustibles have been disposed of by dumping on land, but the areas available within the city are now almost exhausted. Moreover the dumps, particularly the burning dumps, constitute serious

SIX-YEAR PROGRAM FOR PUBLIC WORKS

nuisances. An important step toward the alleviation of these nuisances is being taken in the construction of an incinerator in South Philadelphia. An additional incinerator is scheduled for Northwest Philadelphia in 1951, and for the Northeast section in 1952.

However, the problem of commercial and industrial combustible refuse remains. While some of this material is now being incinerated by the city, present and planned plant capacity is insufficient to dispose of all such waste and present charges to commercial firms are insufficient to cover the costs. It is recommended that the Department of Public Works undertake studies by its own staff or by consultants to determine the character and extent of the problem; and to recommend a program for so disposing of this material as to eliminate completely burning dumps, now a serious blighting factor in the city.

Most urgent is the provision of facilities for the disposal of noncombustible refuse, nearly 2,500,000 cubic yards of which are produced annually. All presently available sites for this purpose are expected to be exhausted by 1955. In anticipation of this, a study has been made by consultants and recommendations have been made for a program of land and equipment acquisition sufficient to care for anticipated needs over a 30-year period. The full program, involving a cost of $11,000,000, has been scheduled, starting in 1954 and being completed in 1956.

Highways and bridges scheduled for construction conform to a comprehensive plan for main highways. Many important ones will be built jointly by the city and the state, with the state bearing much the larger share of the cost. Outstanding among the city-state projects is the system comprising the Schuylkill Expressway and its connections. This will be a continuation within the city of the highway linking Philadelphia with the Pennsylvania Turnpike. The cost of this system will be about $80,000,000 and construction has been scheduled in stages to permit sections of the Expressway system to be placed in service as they are connected. The cost to the city is estimated at $8,833,000. As it is proposed to contract for all construction drawings in 1951, and two years will be required to complete them, the first construction contracts are scheduled to be let in 1953.

The Highway Program

An important project related to the Expressway is the improvement of Roosevelt Boulevard. In the recommended program, this construction has been scheduled to get under way in 1951, so that it will be available for use as a connection with the Expressway. The Pennsylvania Railroad has begun work on improvements to cost over $20,000,000, which it must make as its share of the construction culminating in the removal of the "Chinese Wall." Completion of the work on Pennsylvania Boulevard is an important

(*Continued on page* 94)

● ***WATER pre-treatment plant for the new Queen Lane filters.***

● ***CONSTRUCTION view of Frankfort Creek Flood Control Project.***

Small Distributor Mounted on Dump Truck for Street Maintenance

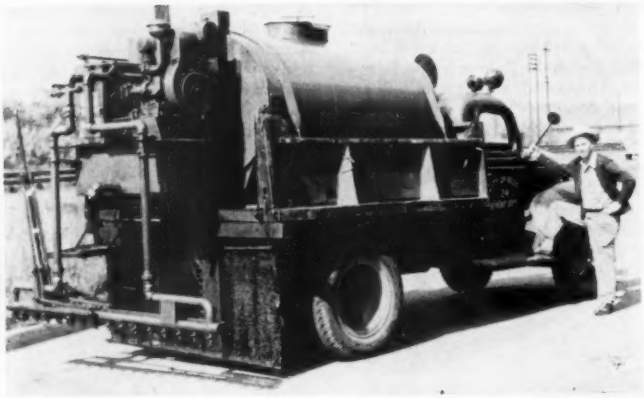
CALVIN W. DIX,
Service Director, Niles, Ohio.

BEING a small community, Niles, O., has a small budget. Appreciating this situation, our Superintendent of Streets, John Rose, contributed an original idea for cutting costs on street patching and repair work. In the development of this idea, our master mechanic, Fred Gilmour, and our utility man, Russell Treffert, aided with advice and suggestions.

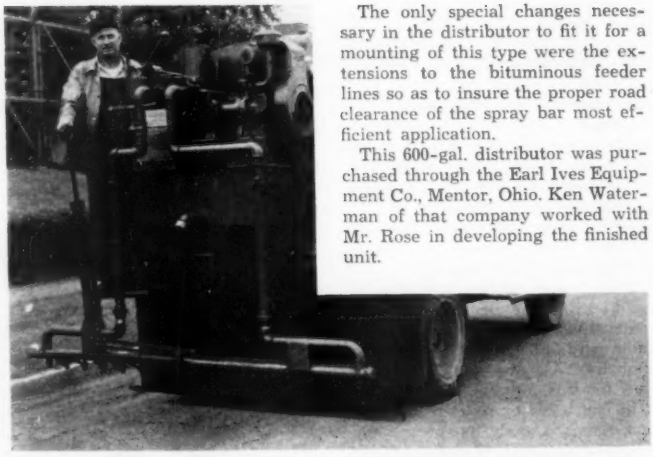
Mr. Rose's first problem was whether to buy an entirely new bituminous distributor mounted on a truck, or a distributor trailer. Both of these are expensive pieces of equipment. If the truck-mounted unit were bought, it would mean that a truck was tied up all year, and considering the few weeks of patching and resurfacing that we have to do, the wisdom of doing this was a question.

To overcome this problem, Mr. Rose decided to buy an unmounted 600-gallon bituminous distributor (a Littleford No. 101) and to mount this directly in a 1½-ton dump truck in such a manner that it could be removed and the truck used for other purposes. This was worked out. The truck was not changed in any way. Mounting or dismounting of the distributor requires only half an hour. With this kind of an arrangement, the truck is available for other uses on very short notice.

With the cooperation of Littleford Bros., the distributor was mounted in the dump body and secured with two metal hold-down straps fastened over the tank of the distributor as shown in the picture. These straps were bolted to the sides of the truck body. To prevent accidental dumping, the dump body was bolted to the frame of the truck.



● ***THIS view shows mounting of distributor in dump truck body.***



● ***BUSINESS end of distributor showing extended feeds to spray bar.***

The only special changes necessary in the distributor to fit it for a mounting of this type were the extensions to the bituminous feeder lines so as to insure the proper road clearance of the spray bar most efficient application.

This 600-gal. distributor was purchased through the Earl Ives Equipment Co., Mentor, Ohio. Ken Waterman of that company worked with Mr. Rose in developing the finished unit.

DIESEL POWER FOR PUMPING AND CIVIL DEFENSE

DIESEL emergency power for the City of Park Ridge, Illinois, has helped convert a manually controlled pumping station to a fully automatic plant. By smart planning for the future, with an eye toward civil defense, this residential Chicago suburb of 16,510 people has been able to accomplish what other communities of similar size have debated for years.

Plagued with a big water system having no elevated tank or standpipe, City Manager D. B. McCabe and Mayor Alfred P. Haake sought a means of eliminating possible water failure during emergency conditions, while at the same time streamlining the city's outmoded method of controlling pump capacities to match load conditions. The result has given this community a prominent place in city plant modernization and application.

Of particular interest to cities confronted with the civil defense program, Park Ridge's station site merits considerable attention.

Located underground on the site where the old city hall once stood, the automatic plant is ideally suited to withstand possible bomb damage in the event of aerial attack. Perhaps the city planners in former years little realized to what advantage an underground pumping plant would be, but today's city council and local residents are fully aware of its capabilities and are planning accordingly.

The New Equipment

Today, Park Ridge has: (1) A modern automatic pumping plant designed to handle an adequate water supply for at least 20 years and to cope with a potential population increase of 65,000; (2) A "Caterpillar" diesel electric set generating 75 KW to be used as standby power in the event of city power failure; (3) An "Autocon" switch panel, the "brain" for controlling water pressure and supply, and; (4) The elimination of added maintenance and operating expense by converting the manually operated station to automatic. The Electric Service Engineering Company of Chicago served as electrical contractors on the installation. It is later planned to incorporate automatic start-stop equipment that would "kick on" the diesel immediately after city power is curtailed.

The City of Park Ridge is fed by two main water lines from Chicago. One is a 12-inch line from the Northwest Highway, the other a 24-inch line from Touhy Avenue. These lines serve the 2,000,000-gallon underground reservoir adjacent to the pumping station. A 15-foot level is maintained with a working capacity of 725,000 gallons.

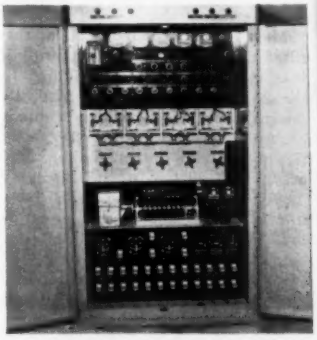
During standby operation, the diesel will supply power for a 6-inch Goulds centrifugal pump driven by a 60 hp electric motor. In addition, it will supply power to operate the local Police short-wave radio, police station house lights, fire siren, and pumping station lights.

In an emergency, lack of adequate water pressure can raise havoc during fire. With standby power, water pressure can be maintained for fire fighting purposes. Equally important is the fact that this Diesel engine can provide, under normal conditions, sufficient water pressure to permit the proper use of sanitation facilities, thereby guarding the health and welfare of the community.

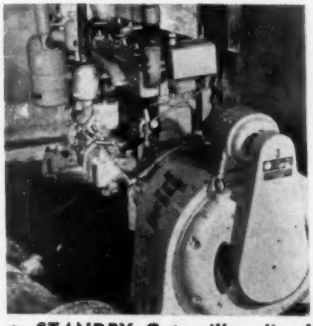
With the "Autocon" automatically controlling the three large pumps, five possible combinations are available: (1) 2,270,000 gallons per day with the 6-inch pump; (2) 3,500,000 gallons per day with an 8-inch pump to carry the average daytime load; (3) 5,470,000 gallons per day with a 10-inch pump, ample at all times except during peak summer conditions and fire fighting loads; (4) a combination of (1) and (3) with total capacity of approximately 7,750,000 gallons per day, the requirement for peak loads; and (5) for extreme emergency conditions, a combination of (1), (2) and (3) which provide a total of approximately 8,000 gallons per minute, or a potential 11,200,000 gallons per day.

The "Autocon" controls the operation through impulses received from a monitoring system in the community service or feeder line. The water pressure is not permitted to drop below 48 psi. If water usage increases to the point where the pressure drops, the "Autocon" immediately selects another step with more capacity. This action raises the pressure to the desired level. The same control is exercised when the water pressure increases to the permissible maximum.

With this modernization, the City of Park Ridge has looked ahead to the future and has planned well for the benefit of its community with regard to health, sanitation, and emergency. As Mayor Haake put it, "I wish all communities could have this. We are very fortunate to accomplish this much needed improvement, but no less important, it gives us a means of protecting ourselves as part of the civil defense program."



● ***MONITOR switch panel by Autocon controls pumping.***



● ***STANDBY Caterpillar diesel supplies power for many jobs.***

REBUILDING AN OLD TRICKLING FILTER

The reconstruction of this old trickling filter, built in 1929, has brought to light much knowledge on how to design and build better filters. This article tells some of the findings.

GUY BROWNING ARTHUR

FILTER No. 4 in the Fort Worth sewage disposal plant has been rebuilt. It is now working well in comparison with the other three in the old system. Experience with it since it was first constructed in 1929 offers much of value to sanitary engineering.

Most of the knowledge about this filter did not come to light until it was taken down for rebuilding. In the 20 years it has been in use, the design of filters and the methods of building them had been greatly improved. How much better they are now is shown by the care employed in putting Filter No. 4 back into operation, and by the construction of the eight new filters now being added to the plant.

Filter No. 4 is 410′ x 126′, covering about 1¼ acres, and of course when in operation it looked as good as any other filter. The top distribution was by 2″ Pacific Flush Tank round nozzles, staggered in series.

It performed satisfactorily for some time after construction, but just before the war it began to flood. Percolation through the stone diminished until it was mere seepage. The cause of failure was supposedly the failure of the outlet facilities. Soon the voids in the rock filling were clogged, and the filter lay useless.

In a plant struggling to keep up with a fast growing population and new industrial wastes the loss of the filter was serious. Now instead of getting more filtering capacity to meet increasing demands, the load had to be passed through three-fourths of the former capacity.

Some time ago the filter was cleaned out. Close watch was kept on the operation to discover what had caused the failure. The grading and placing of the rock were under suspicion. Much was learned about how *not* to build a filter.

The bottom drainage was through 4-inch round half-tile, without bells. These were laid open-side-down, in their strongest position to carry the load of stone. They were placed close together, so there was little chance to spread. The keying effect of the stone could be expected to keep them wedged down in position. When all the tile had been laid the rock was filled in. This filling was 8-ft. deep, requiring about 500 cars of stone.

When the filter stone was removed, most of the tile was found to be broken. The old hands around the plant began to think back to see what had happened. They recalled that after the tile had been laid, and some stone had been placed by rough means, dump cars were run right into the filter and dumped. Belt conveyors were used to move stone into some areas not easily reached by the dump cars.

Learning About Filters

It is now agreed that this is not the way to spread stone in a filter. More than likely the tile was broken by the weight of the dump cars and the impact of falling stone at the very beginning. Nothing in the routine operation of a filter could cause so much breakage. The conclusion is that the filter was reduced to only a small fraction of its natural effectiveness before it went into operation.

When the old stone was taken out, about a third of it, 150 cars, was lost because it was under size. This was given to the street department for the construction of roads around the plant. The cause of this undersize in the stone may have been attrition by solution and abrasion, but some of the stone may have been too small when it was placed.

Rebuilding Procedures

In the rebuilding of the filter, at a cost of $74,000, everything was done to make it as efficient as any modern installation. The concrete structure was as good as new. Valves and piping were replaced where necessary.

The first important improvement was the use of Armcre underdrain tile, rectangular vitrified clay, made by Ayer-McCarel-Reagan Clay Company, at Brazil, Indiana. The specifications called for a test strength of 600 psi for this underdrain tile.

Next, this tile was laid on a 1″ layer of 1:5 cement-grout dry cushion. This gives each tile a firm bed under its entire surface, and makes its full strength available. Each tile is held in place, no matter what happens to the tiles around it. As the tiles were placed over small areas the cushion was dampened and allowed to set without being disturbed.

Excellent grading specifications for the stone were another improvement. The lower three feet of stone was of new material, graded as follows: passing 4-inch screen, 100%; passing 3½-inch, 90 to 100%; passing 2-inch, not over 10%; passing 1½-inch, not over 2%.

The method of placing the stone is the most important change. When the underdrains had been grouted into place and the grout had set, stone was pushed ahead over this area by a Hough front-end loader until it was about two feet deep. When sufficient stone had been placed, wooden mats were laid for a track for the loader, and from then on all work was done on these mats. When the filled area was large

enough a bulldozer was brought in on similar mats to spread stone placed by the loader. Underdrains were placed just ahead of stone placement.

One reason for placing the tile only as fast as the area was needed for stone was the desire to inspect the tile during the filling. By looking through the tile from the open end, breakage was detected at once. The contractor was required to dig out those units that were broken under the loading. He had to dig out stone in a pretty big hole to get down to a broken tile and replace it with a sound one. Every failure of the tile slowed the filling, but those in charge were determined that the filter would not start in operation the second time with its flow impeded by breakage on the bottom.

When two feet of stone covered all the tile, it could be reasonably expected that no further breakage would occur. Every additional foot of stone would increase the arching effect of the load and spread the load over a greater area. But it was not the added weight of stone that was dangerous. It was the weight of the machinery, and the use of wooden mats was continued to spread the moving load over a larger area.

Stone which had been taken out of the filter was used for the top 5 ft. of the new job. But it was thoroughly tested for solubility by sewage acids, and also for abrasion, to determine its resistance to attrition. It was found suitable under these tests.

A peculiarity of the stone used for filters in this part of the country is the content of asphalt. Sometimes a piece of stone which is apparently sound will become so soft under the hot summer sun that it can be pressed and molded in the hand. Just what this does to stone that is otherwise suitable for a filter is not known, but the specification for all new stone limits the asphalt content to 1%.

Filter No. 4 has contributed a great deal to the progress of filter design and construction. Now that it is performing efficiently along with the other three installations it will go along in hum-drum fashion, passing millions of gallons of sewage through its stone and tile, practically anonymous: Like many a man who has said his piece and gone off the stage.

Eight new filters are being built at the plant. Each one will cover about ¾ of an acre, and handle a million and a half gallons of sewage a day.

"Of course," we say, "this is planning for the future." That's an old saw in Ft. Worth. To keep the sewage plant in step with a population which has grown 75% in ten years is something of a job. To sell the idea to a city administration and the taxpayers is a bigger job. Increased industrialization contributes perhaps a greater load than the increase in population. The Consolidated Vultee Airplane plant alone has 26,000 workers, compared with 12,000 a year ago. The city's industrial wastes are equivalent to an increase of 20,000 in population.

The new plant was planned for "far ahead needs." When it is put into operation about 18 months from now it will be loaded to capacity at the outset. W. S. Mahlie, Superintendent of the plant, remarks: "We always manage to keep one war behind."

● ***FRONT** end loader placed first 2-ft. layer of stone; then wooden mats were used to protect underdrains from weight of machinery used in placing media.*

● ***UNDERDRAINS** have been placed and the first layer of stone has been spread, lower right.*

● ***UNDERDRAINS**, brought in by truck, are set on dry grout bed which is then wetted.*

—MORE WATER *for* MUSKEGON

ARTHUR J. O'CONNOR

MUSKEGON, Mich., a city of nearly 50,000, will find out next summer just what its water demand is. Over the years, the city's water department has never been able to determine just how much water is needed to meet the demand. In the heat of August dog days, the water supply so far hasn't been able to keep up with the demand.

Although there is a plentiful supply of water—the countless millions of gallons in Lake Michigan which laps the city limits—it has been impossible to get the water to where householders could use it. It has never been a case of supply—it has been lack of proper distribution. In certain sections of the city and in North Muskegon, which is also supplied by Muskegon, it has been impossible to get water on second floors during hours of peak demand during hot spells.

Muskegon had a phenomenal growth during the war years when its heavy industries were turning out material for the armed services. Municipal services could not keep pace with the city's expansion. Water service began to lag because extension of facilities was far behind the new home construction and industrial expansion. The situation became so serious in the late summer of 1949 that sprinkling had to be drastically curtailed.

It was a situation which harassed city officials as householders turned in a steady flow of complaints on the lack of sufficient water pressure. Fortunately, for the officials the area did not experience a hot summer in 1950 and so the demand for sprinkling water nowhere approached that of 1949. It can't happen next year because the city's largest single improvement project will be ready for operation in 1951. It is a $1,250,000 water distribution expansion which provides a 30-inch supply line to supplement the two 24-inch mains which previously were the sole sources of supply from the filtration plant to the maze of mains which serve the city and environs.

Completion of the new pipe line means the realization of a dream City Manager George F. Liddle has nourished for more than a quarter century—from the time he was employed in the city engineer's department while still an engineering student at University of Wisconsin.

● ***NEW 1 MG standpipe; above are C B & I workmen erecting it.***

The two 24-inch mains which serve the city were constructed in 1912 when the city started taking its water supply from Lake Michigan. At that time it was considered such large feeders would suffice for all time. That not only has been proven incorrect, but the two large mains pass under a bridge crossing Ruddiman Creek. Should the bridge ever go out, Muskegon would be without a water supply. It was that possibility which prompted Mr. Liddle many years ago to consider another pipe line which would get into the residential, industrial and business districts without crossing the creek.

Now that plan has come to fruition. There were many sideroads which delayed the project. In 1936 a filtration plant was constructed and the city's first standpipe—with 1,000,000 gallons capacity—was constructed. Nothing more could be done until the revenue bonds for that work were retired.

But, early in 1950 the city commission adopted Mr. Liddle's recommendations that the distribution system be enlarged. Funds to meet

outstanding bonds for the earlier improvement were placed in escrow and a new issue of $1,250,000 was approved.

In addition to the big new main, a second 1,000,000-gallon standpipe was constructed in the north end of the city. By Sept. 15 the new system was ready for operation, but with the fall season near the demand wasn't present and now the city will have to wait until next year to learn just what that demand will be. It will be the first summer that Muskegon residents will have available at their finger tips all the water they want.

The new improvement included 28,800 feet of 30-inch mains; 10,800 feet of 24-inch mains; 6,600 feet of 20-inch mains; 4,300 feet of 14-inch mains; and 1,400 feet of 12-inch mains. The standpipe and a new 12 mgad Ingersoll-Rand pump were also included in the improvement.

The present distribution system can care for 11,631 customers while the improved system is designed to provide an adequate supply of water for 15,300 customers, the estimate of the number in 1980, the year the bond issue for the improvement will be retired.

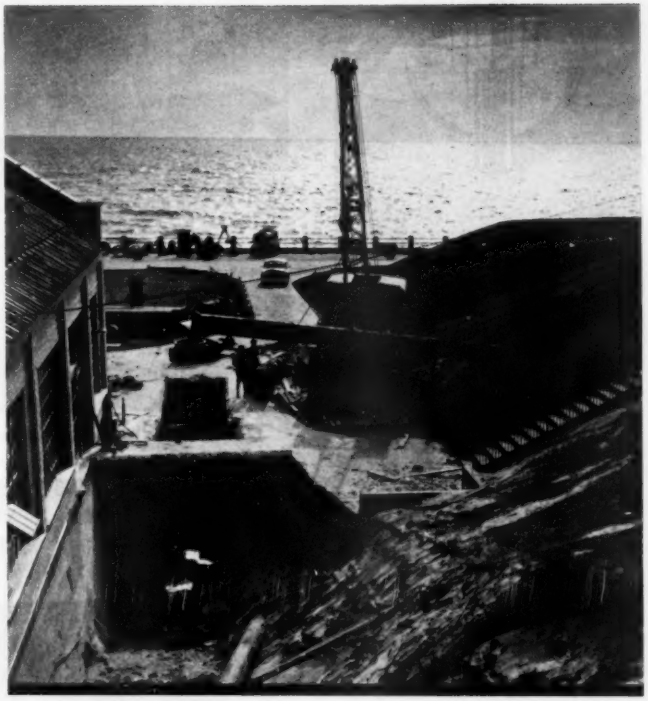
The water supply is brought from Lake Michigan through a 7,000-foot 48-inch intake. Present pumps have a daily capacity of 18,750,000 gallons. The present 128 miles of mains will be increased to 138 miles by the 1950 improvement.

The Muskegon improvement is being watched with interest by other industrial cities which either are faced with the same problems as Muskegon or will be soon if industry continues to expand and population increases as it has over the last few years. It is considered possible that similar water improvement projects may be expected in Michigan within the next few years.

The contract for laying one section of the line, comprising 28,800 ft. of 30-in. cast iron pipe, using mechanical joints, was awarded to Forbrig and Lafave at $2.50 per foot, the city furnishing the pipe at the trenchside. This section of the line traversed a sand dune area where the sand was hard to hold in cuts, but easy to handle; a stretch through normal sandy soil; and some clay and hardpan. In a few places only was the water table high enough to cause trouble. Well points were used only at a stream crossing.

Another pipe laying contract was awarded to Krueger & Davis for 10,782 ft. of 24-in. cast iron at $3.00 per foot and 2,610 ft. of 20-in. cast iron at $3.00. Mechanical joints were used on both of these lines. Dryer Bros. was awarded a contract for laying 2,100 ft. of 20-in. cast iron, using mechanical joints, at $2.95 per ft.; 828 ft. of cast iron, bell and spigot joints, at $3.55 per ft.; 4,320 ft. of 14-in. cast iron, bell and spigot, at $2.80 per ft.; 900 ft. of 20-in. cast iron using Victaulic coupdings at $2.95 per ft.; and shorter lines of 6-in. and 12-inch. Lead joints were used on bell and spigot pipe.

Trenches were dug with backhoes, clam shells and drag lines. Backfilling included tamping and flooding in layers. Pipe had a minimum cover of 5 ft.



● ***CRANE lowers a length of 30-inch pipe into trench near pumping station. Lake Michigan in background.***

● ***36-INCH valve connection being placed at Pump Station.***

HOW CIVIL DEFENSE!

ROBERT K. RUSH
Assistant to Director of Civil Defense
Wichita-Sedgwick Co., Kans.

● ***MOBILE** communications team: Two operators and a driver.*

● ***ONE** of approximately 240 first aid classes being trained.*

AS a result of being given a leading part in our national defense program during World War II, the Wichita-Sedgwick County area has grown to about 220,000 in population. Local authorities estimate that this figure will reach 300,000 by 1955—due to a rapid expansion of the defense activities of this area. This condition results in the area being placed in the top category of places which are necessary to the national defense.

The age of atomic weapons and jet-propelled planes has for all practical purposes eliminated our geographic location from being a factor in our defense. In fact, this area is closer to Russia by some of the more favorable routes than are some of the coastal cities.

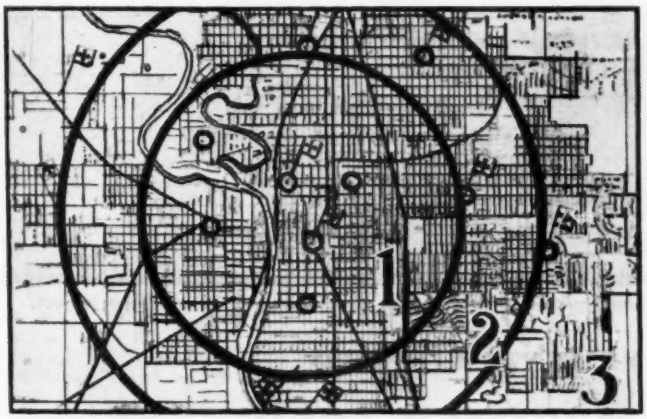
Whether the Wichita area or any other part of our country will be attacked by bombings, sabotage or biological warfare is not known. One thing is certain, however, if the Wichita area is attacked, whether or not this area is able to resume operation again in a short time will depend a great deal on the advance civil defense planning and training.

The Defense Council

The Wichita-Sedgwick County Defense Council was created by joint resolutions and proclamations of the City Commission of Wichita and the Board of Commissioners of Sedgwick County in August, 1950. The Council has five members: The City Manager of Wichita; a member of the Wichita City Commission; a member of the Sedgwick County Board of Commissioners; a citizen appointed by the City Commission; and a citizen appointed by the County Commission.

The members serve without compensation and at the pleasure of the respective appointive authorities. The Defense Council has the following powers and duties.

1. To adopt, amend and repeal rules, regulations and bylaws governing its procedures and activities.
2. To cooperate with Federal and State civil defense authorities.
3. To act jointly and cooperate with other local defense councils.
4. To make recommendations to the City and County Commissions and the State Civil Defense Council on legislation, regulations or other actions necessary to civil defense.
5. To request the cooperation and assistance of the agencies and officials of the City and County.
6. To employ a Director of Civil Defense.
7. The Defense Council and the



● *MAP of a portion of Wichita showing dispersal of facilities.*

IS ORGANIZED IN A CRITICAL AREA

Director shall have the power to do all acts and things not inconsistent with law in the furtherance of defense activities.

Money for Civil Defense

The Kansas Civil Defense Act of 1951 authorizes Sedgwick County to assess a tax for civil defense purposes, which will make available a total of $140,000 in 1951 and a similar amount in 1952. In addition to this, Senate Bill 284 distributes $1,000,000 in existing sales tax residue to the various cities and counties in Kansas. Of this amount, approximately $100,000 will come to Wichita and Sedgwick County combined as a special civil defense fund and may be expended for that purpose in the calendar years 1951 and 1952. Any portion of the $100,000 which is not spent for civil defense may be transferred to the general funds of the city and county and used for general fund purposes during the last half of 1952 or the calendar year 1953.

Thus, there is a total of approximately $380,000 available for civil defense purposes in this city and county through the calendar year 1952. Of this amount approximately $300,000 will be available to be used as matching funds for any local financing the Federal Government may decide to do.

It is the aim of the civil defense organization to minimize the results of enemy action in Wichita and Sedgwick County and to aid any other areas in this general vicinity which are subjected to attack, assuming that we are not attacked at the same time. It is the function of civil defense to inform and instruct the population, individually and collectively, in the preparations they can make and the actions they can take which will provide them and theirs with the greatest amount of protection possible in event of attack. Another function is to organize the local people and facilities in such a manner that effective action can be taken after the attack to hold the loss of life and property and the number of injured to the smallest possible minimum. Not to be overlooked is the task of getting the Wichita area back into production as soon as possible after the attack.

The Long Range View

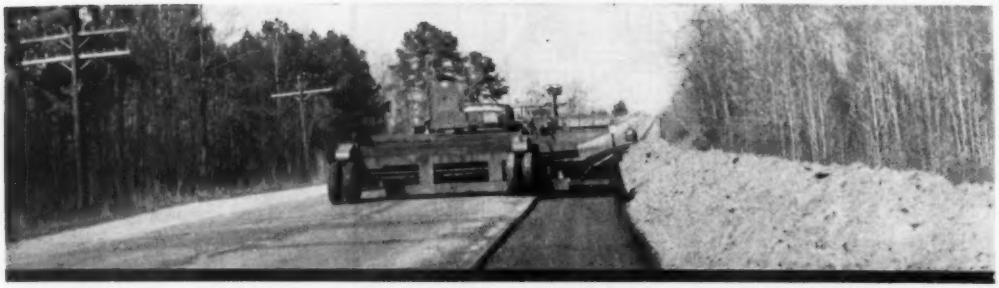
Due to unsettled world conditions it may be necessary to maintain civilian defense for an indefinite period. As a result, to insure an effective and economical civil defense program maximum use must be made of existing equipment, facilities, and organizations of certain types. Duplication in the purchase of equipment must be prevented. It is also important that technical organizations and personnel not be dissipated by permitting them to engage in other types of civil defense work.

It is necessary that the operating divisions of the civil defense organization analyze their needs in personnel, equipment and supplies. After summarizing all of the needs, the amount available for each is determined and properly assigned.

In order to prevent those people who will be needed in their present organizations from volunteering for other types of civil defense work, we have under way a pre-registration program for all such types of organizations. These organizations, along with their equipment and personnel, are assigned to the appropriate division in the civil defense organization. This phase of recruitment is nearing completion and the general recruitment program will

(*Continued on page* 62)

● *IN the schools, children are given regular air raid drills.*



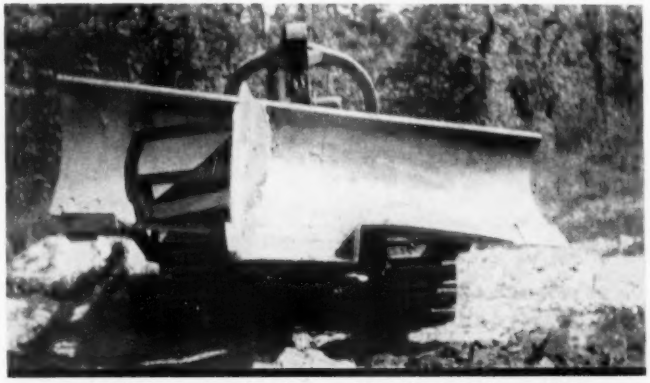
● ***SECOND course of bituminous plant mix being placed with Apsco spreader on widening project.***

PAVEMENT WIDENED WITH JOB-MODIFIED EQUIPMENT

B. W. DAVIS,
Chief Equipment Engineer,
N. C. State Highway & Public Works Comm.

PAVEMENT widening in North Carolina was described in PUBLIC WORKS for August, 1949. That article showed the use of a shovel type loader on the "front end" of a pneumatic tired tractor (Hough Payloader) with a digging bucket modified for excavating the pavement widening trench.

The pictures herewith show another modified unit of equipment and how it is being used on a similar job. This modification consists of electrically welded attachments to an angledozer used with an 80 HP crawler tractor (IHC TD-18 & Heil Angledozer). The attachment for cutting the trench can be removed at the completion of the project without damage to the tractor-dozer unit. The widening project shown is on US 301 in Halifax County, North Carolina, between Weldon and Whitakers and is now in progress (June 5, 1951). The project is 23 miles long and, in general, calls for a 2-ft. widening on each side of an 18-ft. pavement. The widened road will be resurfaced with a hot-mix bituminous concrete consisting of 150 lbs. of binder course and 150 lbs. of surface course (a total of approximately 3″). The base for the widening is also a hot-mix bituminous concrete made from local aggregate. The widening will be 9″ thick (to which will be added the 300 lbs. surfacing) and is being placed in three layers. Side forms are not used for the widened section. The base is being made 27 inches wide, or 3 inches wider than the surface.



● ***CLOSE-up view showing modifications of dozer blade.***

The use of the tractor-dozer shown herewith is preceded by (1) a heavy duty motor grader (100 HP) which blades the shoulder so that it slopes away from the pavement; then (2) the heavy duty motor grader scarifies the area to be excavated. The tractor-dozer with trenching blade follows the scarifier. Two to three trips are required for the dozer blader to complete the 27-inch by 9-inch excavation. Very little hand work is required after the dozer work is completed.

On curves where the widening is extended to 4 or 6 feet in width, a chain guide on the back of the dozer is used to make it possible for the tractor operator to widen the original cut 27 in. wide which the modified dozer blade is designed to excavate.

In cut sections where the material from the widening is not needed, a second handling operation is required.

The project is being constructed by Nello L. Teer, Durham, North Carolina, under W. N. Spruill, Division Engineer at Ahoskie, and E. S. Peabody, Resident Engineer at Weldon, North Carolina. The equipment modification was done by the contractor.

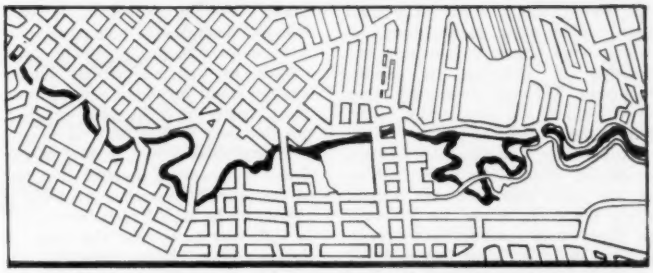
● ***FINAL cut with special blade.***

USING SODIUM NITRATE FOR ODOR CONTROL IN A POLLUTED STREAM

PHILIP N. ALBRIGHT,
Public Health Engineer, San Antonio, Tex.

IN the late summer and fall of 1950, an area just north of the downtown section in the vicinity of the San Antonio River was plagued by very offensive odors which were shown to arise from the river. Careful investigation showed that this odor did not come from a sewage leak into the river as had been supposed. Just prior to this period, there had been an extended drouth over much of the area of Bexar County and of the area north and west of San Antonio comprising the outcrop of the Edwards Limestone aquifer from which San Antonio derives its water. The river has its source about 3 miles north of the downtown section and derives its water from flowing and pumped wells and from springs. The flow from these had been greatly reduced due to the lack of precipitation already mentioned.

For many years past, a large brewing company situated in San Antonio had discharged its waste from the bottle and keg washing plant into the river. The assumption was that the flow of the river would be sufficient to dilute this water so that no bad effects would be obtained from it. Careful examination of the entire river above the downtown area was made. No other source of pollution was found and so it was assumed tentatively that this was the cause of the odor production. Samples were taken from the washing plant on a half-hour sampling basis and these were sent to the laboratory for analysis. They showed a 5-day BOD ranging to over 500 ppm. Immediate steps were taken to arrange for the discharge of the washing water into the sanitary sewer system. However, it was found that the sewer lines in that area were overloaded and that it would not be possible to add this load to the sewer. Accordingly, plans were made for the laying of an additional relief sewer line which could take this load and also relieve the load on the existing lines.



● *MAP shows course of San Antonio River through the city.*

Causes of the Nuisance

Meanwhile, the drouth continued and the odor problem increased and it became necessary to take immediate action to reduce this nuisance. Through observation and testing, it was noticed that odors in the river water vanished at periods of low

● *WEED growth in river channels reduced the velocity of flow and accentuated troubles.*

● *FALLS in the river marked the point of greatest odor due to turbulence of water.*

temperature and during sunny days. Likewise, the odors became more apparent on warm nights and if the following day was dark and cloudy, these odors persisted much longer than on bright days. Investigation of the plant growth in the river water showed the presence of a great many microscopic plants, many of which were chlorophyl bearers and capable of carrying on photosynthesis. Through these and other observations, the conclusions listed below were obtained.

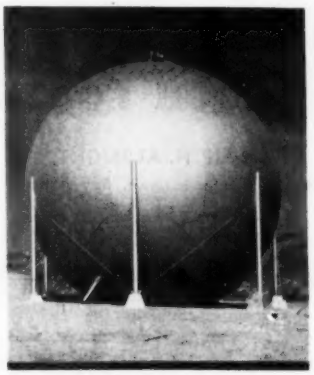
Apparently, putrescible matter contained in the river water settles in the pools and quiescent waters along the river below the brewery. In these deep pools, when oxygen is depleted, a large amount of anaerobic growth of bacteria can take place. This probably results in the production of indole, skatole, and the mercaptans which are responsible for the odors. When sufficient oxygen is present, anaerobic decomposition cannot take place and the odorous substances are not produced.

During the period of the day when sunlight can shine on the water either directly or through reflection, it reacts on the chlorophyl in the microscopic and filamentous plants present in the water and results in the giving off of large amounts of oxygen through photosynthesis. This oxygen is dissolved in the water and is used in the aerobic decomposition so that complete oxidation and stabilization of the putrescible material in the water takes place. This results in the production of carbon dioxide, water, sulphates, and nitrates. All of these materials are non-odorous so that there is no odor production when the day is fairly bright. Conversely, at night time photosynthesis ceases with a consequent stop in the production of oxygen. Soon the dissolved oxygen in the water is consumed and at once anaerobic decomposition commences with its consequent production of the odorous partial oxidation products mentioned above. However, a lowering of the temperature of the water results in a great increase in its ability to dissolve oxygen. This oxygen is obtained from the atmosphere. The same results are obtained as if the oxygen were produced by photosynthesis in the water. As an example of this condition, when the temperature of the water drops from 86 F. to 44.6 F. the amount of oxygen that can be dissolved in the water increases by 59%. Our observations showed a temperature drop of almost 20° F.

As a result of these observations, it appeared desirable to us to attempt by artificial methods to assist in the continuous growth of the aerobic forms to the end that no odorous substances would be produced. For this reason, it was thought desirable to add oxygen to the water. Sodium nitrate was chosen as the medium by which oxygen could be added to the water most easily and at the smallest possible cost. It has been variously estimated that if 10% to 20% of the 5-day biochemical oxygen demand of the putrescible matter present in the water be added to it, the result is sufficient to change the type of decomposition from anaerobic to aerobic stages. We attempted to do this through the addition of a calculated 200 pounds of sodium nitrate to the offensive section of the river. This was added at five different points along the odorous section. By experience, it was found that 150 pounds of sodium nitrate was all that was needed to bring the putrefaction from the anaerobic to the aerobic state and to eliminate odors.

The results of this method of treatment were extremely gratifying. We were able to eliminate entirely the odor produced by the river water for a period of about 4 days at a time. After application, it took from 6 to 12 hours for the odors to subside. The one difficulty that we encountered was that the flow of the river, although very slow, was sufficient so that the nitrate was either completely used or passed on down the river with the current so that after 4 days the odors began to appear again and increased for about three days to their original intensity.

The cost of the method was not prohibitive and the results were fine. Sodium nitrate could be obtained in 100 pound lots at a cost of about four cents per pound. By this method we were able to gain enough time and respite from complaints so that the new sewer line could be installed and the conditions corrected with a minimum of annoyance. We tried two methods of applying the sodium nitrate. First and most useful was the manual addition of 20 to 30 pounds at each point of application. Second, and not too successful was the method of putting about 150 pounds into a burlap sack and staking it in the middle of the stream above the brewery.



● ***DIGESTER gas is stored under 50 lbs. pressure in 57½-ft. sphere.***

UTILIZING SLUDGE GAS AT LOS ANGELES

THE gas utilization facilities at the Los Angeles, Calif., Hyperion sewage treatment plant consist of a high pressure holder, a low pressure holder, collection and distribution mains, compressors, purifiers, regulators and waste gas burners.

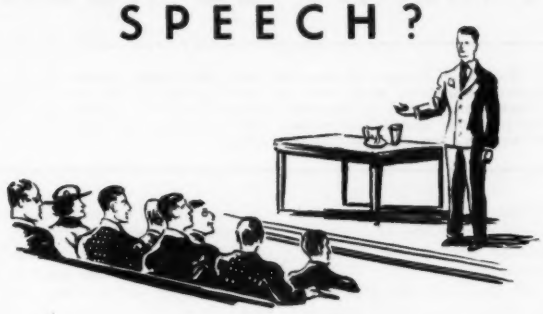
The gas produced by the digestion process collects in the domes of the 18 digesters and is metered before it enters the 30-in. collection main. The low pressure holder, which has a capacity of 100,000 cu. ft., is connected directly to the supply line and maintains a pressure of 5½ to 6½ in. of water in the digesters.

Three Worthington duplex, single stage, direct acting, V-type compressors take gas from the main supply line and pump it into the high pressure holder. Each of the compressors is capable of compressing 1,050 cu. ft. of gas per min. from zero gauge to 50-lbs. per sq. in. The compressed gas is cooled in an after-cooler system to not more than 20-deg. Fahr. above the temperature of the cooling water.

The high pressure holder is a 57-ft. 6-in. diam. Hortonsphere designed to operate at 50-lbs. per sq. in. pressure and has a capacity of 135,000 cu. ft. based on a usable pressure increment of 20-lbs. per sq. in. It is connected through regulators to an 8-in. line which supplies gas at 24 lbs. per sq. in. pressure to nine 1,688 hp dual-fuel diesel engines in the power and blower

(*Continued on page* 95)

SO YOU HAVE TO MAKE A SPEECH?



ERNEST W. FAIR

EVERY public works official at one time or another has to make a speech before a civic group, a convention or what have-you. And when that time comes he wants to make the best possible speech in the best possible manner.

A friend of the writer who is a public works official found himself in such a dilemma the other day, so he asked that we give him some ideas that would help. We asked a lot of public speakers pertinent questions, did some "boning" among the sages on the subject and came up with a list of suggestions which enabled our friend to pull through with the proverbial "flying colors."

He suggested that there were undoubtedly some other officials who would benefit from this help, so here are the pointers he found helpful to himself.

Helpful Pointers

If you want to avoid sounding like a stuffed shirt, speak in the same style and language you use in everyday life; it'll come natural; any other way will be forced. If you pick up some data or information somewhere, present it in your own words, not those of the source. In essence, say it your own way.

Talk louder than you have to—not only will you be sure to be heard clearly, but instinctively you will put more effort into what you say when you talk louder than normally.

Change the pitch of your voice—one pitch gets horribly monotonous. Whisper some, yell out on another point and use your normal voice, but vary the pitch of your voice throughout your speech.

Keep your points down—you will make a much more lasting and worthwhile impression if you limit your message to three or four well-emphasized points than if you attempt to "snow-under" the audience with a deluge of facts and fancies.

Leave things alone—that means the necktie, the watch chain, the "specs" or anything else that attracts the attention of the audience away from what you are saying and to what your hands are doing.

Look good—a good appearance means an awful lot toward getting the favorable attention of your listeners; so don't do as so many business and professional men have a habit of doing . . . make the speech in the same clothes you have squirmed around in all day.

Watch for repetition—nothing ruins a good speech more completely than constantly repeating a pet cliche or even a pet word . . . if it's good, it will register the first time it's heard: if not, then it's best not even mentioned that one time.

Stand still—stand in the same position as much as possible; don't put on a military drill in front of your audience. They are not interested in such antics and besides it detracts from what you are saying.

Don't droop—it pays to stand on your toes when you talk. Don't sag or relax. It also pays to remain alert throughout the whole ordeal no matter how tired you may be, and give the audience the impression that you are full of energy and rarin' to go every minute you are talking.

Put on a good show—your speech should be the high point of the evening's program; do your best to see that it is. The official who begins his speech firmly convinced that he can give a lot better speech than the "guy" who preceded him or the one who spoke last week IS going to give a better speech.

Work hard on the ending — it doesn't pay to have a top-notch speech and an excellent delivery and then have the whole thing ruined by a bad ending. Say or do something the audience can enter into, can feel a part of, and can feel that they have really heard something which was worth the time they spent listening to you.

Never apologize—for the weather, the speech, its length, the hour, your voice, or anything else. People don't want to listen to such things. If you call attention to some small thing, the imagination of your audience may seize upon it and magnify it. If there's anything wrong, it is better to cover up the whole business and forget it; maybe no one will notice the situation anyway.

Time yourself carefully—the most common mistake of the first-time speaker is to go to one of two extremes. He either makes his speech too short or too long. Timing is of the utmost importance in addressing any audience.

Be careful of jokes—a joke which has no point in your message doesn't belong there; if you must pull 'em, make sure they are well placed, well told and have some relation to your speech. Avoid dialect jokes; it takes an expert to put them over.

Surprise your audience—an unusual twist in the process of speech-making always wins an audience friendliness. For example one speaker we know stood on the platform leafing through some 100 typewritten pages of notes as he was being introduced. We all groaned inwardly at the prospect of a long and very dull speech ahead of us. Instead the speaker looked straight into his audience and remarked that he was sure no one was interested in what he had worked up for a speech, threw the whole batch of typewriter paper into a wastebasket, and proceeded to give one of the best informal speeches we have ever heard.

Be sure of pronunciation—all of us have a habit of mispronouncing a few words and are really never aware of what we are doing. However, when these are so spoken in a speech before even a small audience they stand out like the well known "sore thumb" and can ruin the whole receptiveness of an audience.

The Procurement MERRY-GO-ROUND

Gil Guetzkow, Director of Priorities and Allocations, Central Board of Purchases, Milwaukee, Wisc., has this lively article in The Municipality, published by the League of Wisconsin Municipalities. Your editor hopes that by the time this reaches our readers, the situation it describes will have been corrected; but it is still worth reading.

HERE is your opportunity to look over the shoulders of a municipal purchasing officer as he pursues his task of securing defense order ratings and endeavoring to help obtain supplies urgently needed by his community.

At the present time he is allowed to use a rating known as defense order No. 97 (DO-97) for maintenance, repair and operating (MRO) supplies. However, within recent weeks more and more items have been added to the list on which he cannot apply the DO-97.

Effect of the CMP

There is a feeling that this rating is on its last legs due to the controlled materials plan (CMP). Will this make it easier? After reading and studying the various CMP regulations several times, one finds that local governments have no part in it. One cannot find any provisions which have been made to meet the problems of local government purchasers.

Before he has time to get too concerned over this situation, he finds himself busy trying to get steel window frames for a new fire house about which he has just been informed construction is to be stopped because the contractor is unable to supply the frames. The DO-97 cannot be used because it is new construction and is not an MRO item. Although fire fighting is definitely an operating arm to government, construction for new facilities to carry out this function is not considered operating. Since this is an acute problem and there are 5 or 6 more similar problems to be ironed out, he fills his brief case and goes to Washington.

No Coordinating Agency

If he forgets to make a room reservation, he is just as likely to end up on a park bench as not. But that would be just a toughening up process for what is to come from then on! He is now on the Washington "Merry-Go-Round"!

He finds that if his problem is school construction or supply needs, he petitions the office of education, federal security agency; if hospital construction and health supply, he must go to a separate branch of the public health service, federal security agency; if welfare, recreation and related activities, he contacts separate branches of the federal security agency for each of those functions.

If his problem is housing, he goes to a separate agency in the housing and home finance agency; if it concerns food and its distribution, he consults a separate agency in the department of agriculture; if it concerns the operation of the local government's electric utility, he contacts a separate branch of the department of the interior (the defense electric power administration).

Should the problem be highway construction and maintenance, including urban streets, he must consult the bureau of public roads for help. However, if this road leads into a civil airport, then the civil aeronautics board must be consulted.

If the problem is in the field of civilian communications, he contacts the administrator of the national production authority; if the problem has to do with sewage or water, he goes to the same source; if the problem has to do with local community facilities not elsewhere specifically designated, such as fire or police, he starts at the facilities bureau of the national production authority; if the problem is not related to construction which no one else can tell him anything about, he goes to the office of civilian requirements of the national production authority. There he will try to find someone to help him.

Capital Construction

If the problem is the construction of a project requiring more than 25 tons of steel, he starts first with an application to a field office of the national production authority. If the project requires more than 50 tons, he will follow this application from the field office through the construction controls division of the national production authority in Washington. Then he trails the application around the capital as it goes through various claimant agencies for discussion and consideration.

Incidentally, as he is making his rounds, he sees all kinds of correspondence being distributed. Consequently, he realizes why it takes at least 10 days for a registered air mail letter of his to reach a specific claimant agency. He finds out that it takes from 2 to 3 days for a letter to move within one department, from one official to another.

He meets a lot of people who have recently been employed by the national production authority. Every so often, one of these persons will be a fellow who does not believe in making any mistakes. Accordingly, he will tell the local administrator "that the directive spells out what is to be done". So there the administrator sits.

After he has made his rounds, assembled as much information as he can and obtained all the help he feels he can possibly get, he hopes he ends up in a hotel. He is immediately confronted with the problem he left at home—"What about CMP? What will the city do?" And so he can start worrying all over again.

He knows that everyone, including those in Washington, takes the services that the cities supply for granted. When the water faucet is turned on, they expect water to flow; when they call the fire department, they expect it to respond. But how to maintain these services apparently is completely ignored.

Sleep finally comes and your representative has a beautiful dream. He finds himself in a position to really "show them". He gives orders for the water to be turned off for one hour, just about dinner time, and then he follows this, by having all the street lights turned off for the entire night. Everyone is now aware of the critical situation that can be caused by a serious lapse in local facilities. Mr. NPA and Mr. DPA are now at his beck and call. CMP is his! Then he wakes up.

But this is not a joking matter. The purchasing officer needs help and lots of it.

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CLEANING UP AFTER The Missouri River Flood

● ***EMERGENCY light and power for flooded industrial firms were provided by portable diesel electric sets such as this one.***

● ***GIANT clean-up campaign was aided by graders and diesel tractors supplied by Caterpillar and local equipment dealers.***

Civil Defense

(*Continued from page 55*)

be started soon. It is estimated that 20,000 civil defense workers will be needed and approximately 20 percent of this number will be obtained through the pre-registration program.

Training Programs

A training program will be essential for most types of civil defense work. The majority of the volunteers will know very little about their job and, in addition, it is hoped that the training program will help maintain the interest of the volunteers. The first training to be carried on has been the first aid course conducted by the American Red Cross in conjunction with the Wichita-Sedgwick County Civil Defense Program. As of now, there are some 240 classes with a total of nearly 6,000 people enrolled. The local high schools and intermediate schools are conducting classes. A large percentage of the teachers and school officials in the city and county are also enrolled. In addition, the Parent Teachers Association members are well represented in these first aid classes. Many of these classes are now completing the standard 18-hour first aid course and the 4-hour civil defense supplement.

Additional training plans are being made for auxiliary firemen, auxiliary policemen, wardens, etc.

Since civil defense may be with us for some time to come, it is necessary that it be organized on a calm, sound basis. There must be no hysteria—no building up of public opinion to peaks of activity only to fall off very sharply. In this connection, the local civil defense organization, in cooperation with the public, private and parochial school systems, have worked out a civil defense program for the schools.

Just completed by volunteer engineers and school officials was a building inspection survey of all school buildings in the city and county. School officials were advised as to the safest and most hazardous locations in their respective schools. The inspectors are aiding the school officials in setting up air raid drills to be carried out in case of an alert.

Not to be overlooked is the excellent support given the civil defense organization by the PTA. They have inaugurated a "Block-Mother" system which will provide a gathering

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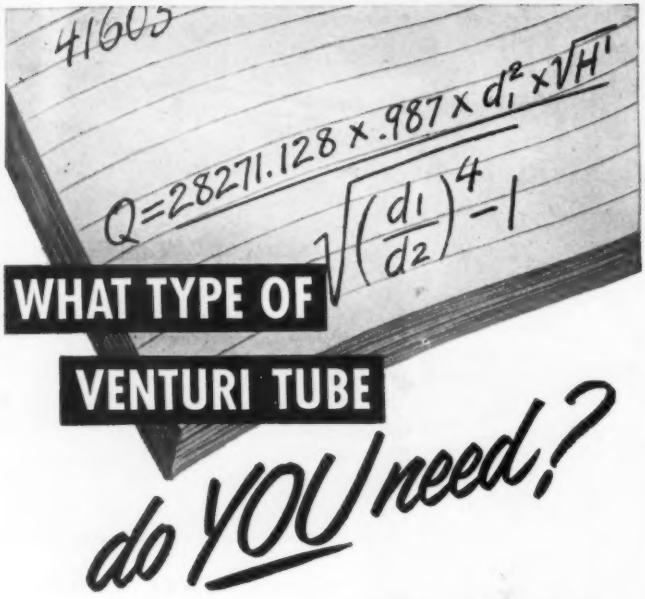

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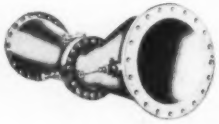
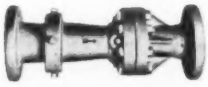


3. Cast iron Venturi Tube with flat invert and single cleaning valve at main and throat sections. Specifically used for sludge.



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point for the children in each block in case they may find their parents absent from their own home and the air-raid alert is given. These "Block-Mothers" are being trained in first aid and other safety measures. "Room-Mothers" are being trained to assist room-teachers in many of the elementary schools. These "Room-Mothers" will be trained and will take part in practice alerts at the school. Much credit must be given to the PTA for this work. Many of the PTA groups have purchased auxiliary batteries for their school radio sets and also flashlights for each room.

The Civil Defense Divisions

Every effort has been made to provide the maximum of efficiency in setting up the operating divisions. Each division director has been instructed to coordinate his plans and operations with the other division directors. When disagreements arise, they are referred to the Deputy Director or the Director who makes the final decisions.

It is the function of the Public Affairs Division to inform the population of the city and county about civil defense and to provide such general instructions as do not require training. Two other important tasks are to promote volunteer recruitment and to maintain interest in civil defense activities, preparations and training.

The functions of the Legal Division are to furnish advice on, and draft, proposed state and city-county legislation on civil defense; and to anticipate and help solve the many legal problems which civil defense activities will create, particularly as a result of actual operations subsequent to attack.

The Mutual Aid Division has already held a meeting with several of the larger cities within a 100-mile radius of Wichita. Mutual aid pacts were discussed and many of the problems involved were worked out. There was general agreement that no one city could combat a disaster of first magnitude without aid from its neighbors.

Locations for eight Mutual Aid Stations have been selected on the main arteries leading into the city. These report stations will have guides to escort the incoming aid to the points of operation. All report stations will have communications with the main control center.

It is hoped that no large scale evacuation will be necessary; however, the Evacuation Division is

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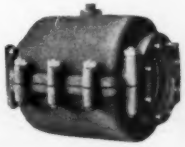

Dresser "Bell-Pack" Sleeve (Style 126) encloses split and broken bells, mechanical joints. Factory assembled, ready to use. Sizes 3" to 24".

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making plans to handle such an evacuation if the occasion demands. A close working relationship is carried on here with the Health and Transportation Divisions.

The Health Division has many tasks dealing with Medical Service, Health and Sanitation, Radiological Monitoring and Chemical and Special Weapons. Auxiliary hospitals have been planned tentatively as regards location, facilities and capacity.

The use of at least fifty mobile aid stations is contemplated and the training of the necessary personnel is under way. In addition, the Health Supplies Branch is selecting many widely dispersed warehouses for the storage of medical supplies and drugs.

Housing and Feeding

The Disaster Relief Division has completed a shelter survey of school buildings, churches, and club houses in Wichita and Sedgwick County. Floor space to accommodate 45,000 people is available as well as dining room capacity and kitchen facilities for approximately 20,000 persons. Provisions are also being made for the keeping of records for the homeless and for work in rehabilitation.

Work in the Public Safety Division will consist of Law Enforcement, Fire Service and Plant Protection. Training curricula have been prepared for the auxiliary police and firemen. The Fire Service Branch has selected dispersal points for the equipment and personnel to move to if and when an alert is received. The Law Enforcement Branch will have the combined strength of the City Police, County Sheriff's office and the Kansas State Highway Patrol. The Law Enforcement Branch will have the difficult job of sealing off the stricken area after an attack. Plans are also being made to stop all incoming traffic to the city, except for mutual aid assistance. Key locations on every road leading into the city have been selected and are to be manned by auxiliary personnel.

The Engineering Division has obtained maps from the local utility companies showing location of lines, mains and other installations. Arrangements either have been made, or are in the process of being made, for auxiliary sources of power and fuel. Surveys showing the number, location and type of engineering equipment available throughout the city and county are under way.

The Communications Division is faced with the possibility of very serious or perhaps almost total destruction of communications after an attack. Plans are being made to utilize every means of communication, including foot messengers, until normal communications can be reestablished. Approximately 30 amateur mobile radio teams have been organized to furnish communication from points surrounding the bombed area back to the main Control Center. Each team consists of three men, two licensed operators and a driver. Each communication team is to have a map of the city and a transparent overlay showing their location in relation to ground-zero and to other teams. As soon as ground-zero has been determined the overlay is centered over that point and the teams will then assume approximate locations to commence operations. The first positions taken will be beyond a 2-mile radius from ground-zero. Immediately after the attack the communication teams will work at one-mile intervals, but will move in closer together as survey teams move into the bombed area. The mobile communication teams are to be relieved as soon as ground lines

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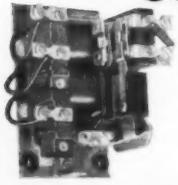

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can be laid by the telephone workers. A test was conducted by these teams under adverse weather conditions and the results of the exercise were excellent. It is contemplated that survey teams, made up of radiological and chemical monitors, a utility representative, fireman, etc., will be the first people to move into the bombed area. They will communicate back to the mobile radio teams either by walkie-talkie or by messenger.

There will also be the task of getting communications out of the city to surrounding areas. The Rural Electrification Administration has 30 mobile radio units and plans have been made to spot them in the surrounding area to relay radio messages.

The entire county, other than the City of Wichita, has been divided into 11 zones for a breakdown of the warden system. A further breakdown will call for township wardens and section wardens. The City of Wichita has eight zones with a further breakdown of area wardens, district wardens and block wardens. An estimated 6,000 wardens will be needed in the city and county.

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The Transportation Division has been given the task of supplying the amounts and types of transportation needed by the rest of the civil defense organization.

Surveys of the number and types of trucks, buses, and motorcycles are either completed or in the process of completion. Railroad companies have reported on the number and capacity of sidings, maintenance shops and roundhouses available, and the types and number of cars usually in the immediate area or within short distance. A survey showing auxiliary airports, private and commercial planes and pilots has been completed. Maintenance and fuel points for vehicles have been located at widely dispersed sections of the city. Plans have been made for transportation personnel and equipment to report to widely dispersed gathering points after an attack for assignment to civil defense duties. Provisions have been made for the conversion of certain types of vehicles to ambulances upon short notice and with a minimum amount of effort and expense. After an attack there will not be enough transportation to meet the demands of all other Civil Defense divisions, so a priority list is being established to prevent any conflict.

The Training Division has the overall responsibility for general and specific training; however, each division is to aid in the preparation of courses of study and the provision of instructors.

It has been the function of the Administration Division to devise the forms needed for the registration of volunteers and for personnel records. In addition, the personnel branch of this division is responsible for the handling of the registration of volunteers (except key people, who were pre-registered). Other functions include Civil Defense supplies and financing, as well as the responsibility for the operation of the control center when one is put into operation.

At the present time work in the organization is centered around general education of the public and the staffing and training of the volunteers for each division. At the same time key people in each of these divisions are working on their division plans. Later on, as more information regarding specifications and financing becomes available from Federal and State levels, the local organization will be prepared to move ahead with its work.

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PUBLIC WORKS DIGESTS

THIS section digests and briefs the important articles appearing in the periodicals that reached this office prior to the 15th of the previous month. Appended are Bibliographies of all principal articles in these publications.

WATER WORKS . . 70
HIGHWAYS AND AIRPORTS . . 77
SEWERAGE AND REFUSE . . 83

THE WATER WORKS DIGEST

Cleaning Filter Media and Bottoms

Austin, Texas, has 17 filter units, the anthrafilt in some of which has been in service for 8 years. These are used in connection with hardness reduction, and incrustation of calcium carbonate has increased the weight (not volume) of the anthrafilt particles to as much as 75%, and it is planned to replace the medium with new anthrafilt every 5 or 6 years. Formerly very long filter runs were the rule and, apparently because of this, large lumps of cemented material formed. About three years ago the filter runs were reduced to a maximum of 75 hr. and this apparently has solved this problem; also reducing the washing periods so that little more total wash water is used and the filter beds are kept cleaner.

To remove calcium carbonate deposits from the porous plate filter bottoms, the filter medium was removed and muriatic acid flowed on the top. As this cleaned only about a ¼ inch depth, the plates were completely submerged with dilute acid, but this gave little improvement, nor did similar use of strong chlorine solution or Calgon. Possible solutions of the problem are abondoning the use of porous plates; or removing them and soaking them in acid or forcing a mixture of air and acid solution through them; or stabilizing the applied water by recarbonation or with Calgon. In 1950 a perforated galvanized steel plate filter bottom was substituted for porous plates in one filter. These plates were 12-gauge perforated with ⅛ inch holes spaced on 1¼ inch centers. They were covered with 9 inches of gravel in three grades, and 27 inches of No. 1 anthrafilt. From the standpoint of uniformity of backwashing and filtering this bottom performs as well as or better than any of the other filter bottoms that we have tried. Obviously we would not recommend the use of galvanized steel with corrosive waters.

A. H. Ullrich—"Water Treating Experiences;" *Water & Sewage Works*, July.

Corrosion Control At New Haven, Conn.

Water supplied by the New Haven Water Co. in 1940 was obtained from several sources with different characteristics, but as supplied it had an average iron content of about 1 ppm and was highly colored, in spite of lime treatment. Beginning in the early 1940's the use of Calgon was tried on one supply after another until it now is used with seven supplies, the conditions of which differ more or less. Some supplies are pumped, some are gravity; the amount used varies from 300,000 gpd pumped in 4 hr. per day, to one in which the flow varies from 1 to 11 mgd; the pH values varied from 5.3 to 6.7.

Starting the use of Calgon may be done in two ways: (1)—starting supplying it at the rate of 10 ppm with hydrants or blow-offs at the ends of the system left open until metaphosphate is found in the water; then closing the hydrants and blow-off and reducing the dose to 2 or 3 ppm. Or (2)—start with a dose of 4 ppm, and continue this until the metaphosphate is found in the entire system, then reduce the rate to that desired for continuous use—generally about 2 ppm. The latter takes much longer; about 2½ years in one system in New Haven where the end of the system is 17 miles from the point of treatment.

In applying the Calgon where the rate of flow is variable the dosage is controlled by hand in some cases. In one a "Chronoflo," actuated by a Venturi tube, starts and stops an electric driven solution pump. In one where the flow varies from 1 to 11 mgd, the Calgon was fed by means of a "Chronoflo," relay switch, solenoid water valve, stainless steel ball check and two Proportioneer chemical pumps; to alter the Calgon dosage, the rate of the solution feed pump delivery is changed manually.

Marshall Wellington — "Corrosion Control at New Haven, Conn.;" *Water & Sewage Works*, July.

Shooting Wells by Directional Charge

The directional charge method of shooting wells was developed for use in oil wells eight years ago. Five water wells have been shot in this manner. Three, in sandstone, had their specific capacity increased by 600%, 375% and 221%, respectively. One in combined sandstone, lime rock and shale, was increased 100%. One in lime rock was increased 1100%, its capacity having been reduced to ⅜ gpm per foot of drawdown by silting up of the crevices. This method uses a special powder (developed for the Army's bazooka shell) which permits the

force exerted to act along a straight line. Fourteen shots are mounted in an aluminum carrier, spaced 6″ apart at successive 90° angles to each other. The charges are directed against the side of the well and bore 2-inch holes 20 inches deep into the formation, with fractures 6 to 8 ft. deep.

George L. Smith—"The Directional Charge Method of Shooting Wells;" *Journal, American Water Works Ass'n*, June.

City-Owned Meters Replace Privately Owned

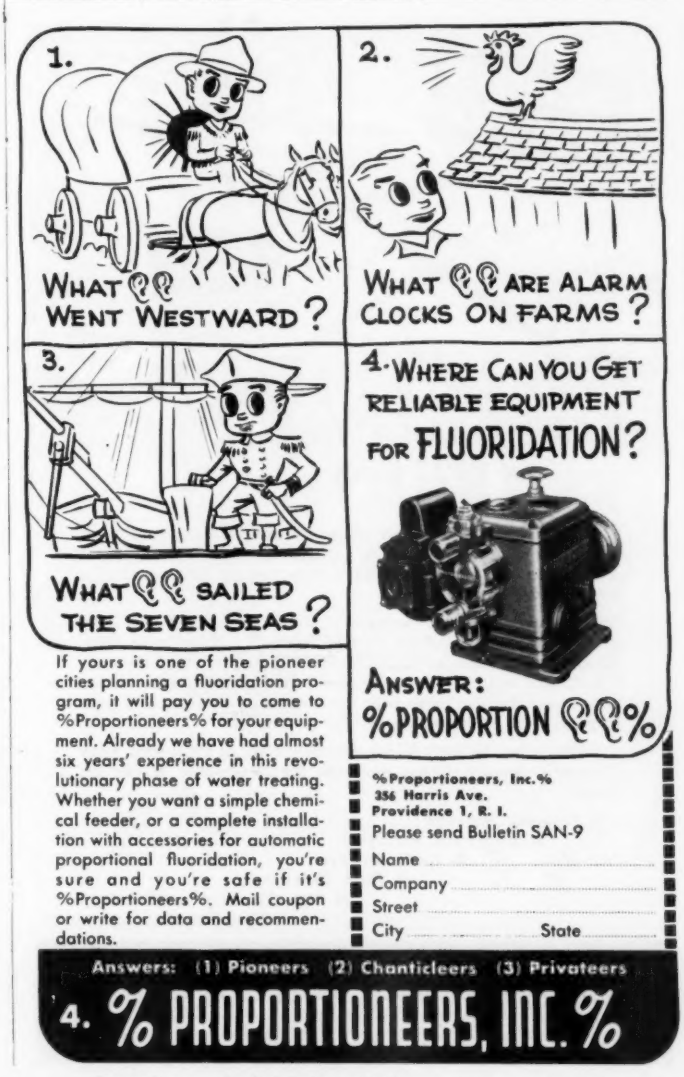
Batavia, N. Y., 18,000 population, has inaugurated the policy of owning the water meters. Originally all of the 4,300 meters were owned by the consumers. Nearly half were over 20 yr. old, some over 30 yr., and more than 100 stopped registering each year. It was difficult to compel consumers to buy new meters and the city developed the solution of replacing and repairing all household meters that need it, and charge consumers $2 a year for the service for all meters more than 5 yr. old. This, it is figured, will provide funds for replacing about 400 meters a year and in 10 years all old meters will be replaced and serviceable ones repaired. At present 500 meters have been replaced, revenues increased by accurate registration, owners repair leaking fixtures, pumping decreased by 50,000 gpd, water loss dropped from 24% to less than 10%, and the users have become more water conscious.

Nelson M. Fuller—"Batavia, N. Y., Replaces Customer-Owned Water Meters;" *American City*, July.

Report of the Water Policy Commission

The Report of the President's Water Resources Policy Commission, made public in sections between Dec. 1950 and Feb. 1951, was presented in abstract in a paper by a member of the commission before the May Conference of the American Water Works Ass'n, and discussed by five water works officials and engineers, revealing several objections to the recommendations of the report.

Among these recommendations were: The river basin should be the fundamental unit for comprehensive planning of water and related land uses, and a uniform policy should be applied to all water and land use development, regardless of which federal agency might have jurisdiction. River basin commissions should be created, composed of representatives of the states and federal agencies involved, under the guidance of an independent chairman appointed by the President. A federal board of review should be created to coordinate the functions of the river basin commissions, to assure the carrying out of a single, uniform national water resources policy. There should be a standard, uniform system of accounting which should show clearly, by projects, all capital, operation and maintenance, and interest costs. The recommendation emphasizes financial accountability and stresses local and state participation not only in the planning and administration of projects but in contributions toward their cost. Repayment on new water resources projects should be governed by the following principles: The beneficiaries of works supplying water for domestic and industrial use should repay the entire allocation of cost to these uses within 50 yr., with interest. Beneficiaries of power projects should repay their full cost, with interest, in 50 yr. Beneficiaries of reclamation by irrigation or drainage should repay the allocated cost, without interest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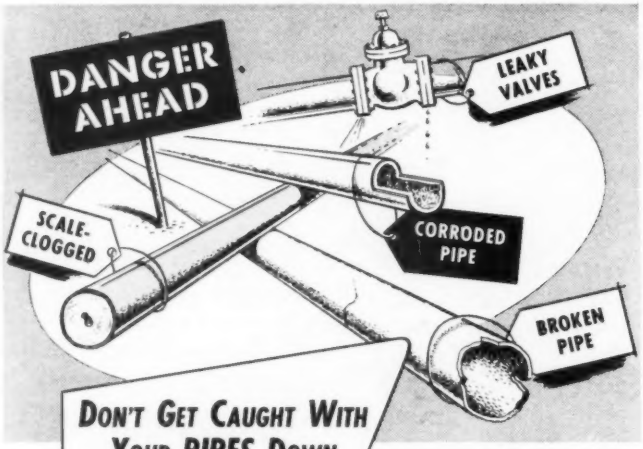
and within their maximum ability to pay. The cost of flood control should be borne in part by the states and local governments, without interest and within their ability to pay. When navigability of a river is improved, tolls should be charged for water traffic thereon. The general government should bear costs allocated to recreation, fish and wildlife. The 1948 pollution control law should be continued.

Most of the objections expressed in the discussion were directed not to any particular feature but to the whole idea of federal control of water developments. Past experiences show that federal expenditures are almost always extravagant, unlimited by sound business principles. . . . The Engineers Joint Council found that we do not need more land for agriculture. Some projects to develop land are estimated to cost $1,000 to $2,000 an acre for land which would not possibly have a value of more than $300 when irrigated. . . . Why federal loans? Many states and municipalities have a better budget balance than the federal government. If a regulation of the volume of water precipitated on a given basis can be effected at a cost which those benefited are willing to pay, local capital will construct the necessary works, as it always has in the past. . . . One political and social group "actually seems to be trying to set up a welfare state by using water resource development as a tool by which to accomplish this." "The primary task of American government is not building, but protection of our liberties."

"Review of the Report of the President's Water Resources Policy Commission;" *Journal, American Water Works Ass'n*, June.



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Peak Rates as a Distribution Problem

In the Southeast, the maximum rate of use of water is approximately 40 to 50% greater than the average daily rate unless industrial use constitutes the major portion of the demand. One Georgia city found that a textile mill using 600,000 gpd with an average rate of 416 gpm had peak rates of 1280 gpm. To meet such difficulties, a So. Carolina city made a special low rate to a bleachery for filling, in off-peak hours, a 5 mil. gal. reservoir constructed by the bleachery. As an alternative to providing mains and pumping capacity sufficient to meet peak demands without undesirable lowering of pressure, elevated storage is often the preferable solution, with the additional advantage of providing a reserve for fire protection. Generally the amount of water required during peak hours at rates in excess of the average rate constitutes 15 to 20% of the daily total use. Careful study of consumption records will serve as a basis for determining the amount of storage required for this purpose. However, elevated storage may not always be the correct solution, or the complete one. In one city it was found that, as consumption in a high-level area increased, the tank in that area never filled and was generally dry before the end of the daily peak. A second line for feeding the tank was laid and so increased the supply that not only did the tank fill, but it never discharged, the pressure on the distribution side of the altitude valve always being greater than that from the tank; suggesting that the secondary line alone would have made the tank unnecessary (or that the tank should have been set at a higher elevation).

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Efficiency of Night Construction with Lights

Studies of lighting systems for construction equipment to permit night work have been made by the Corps of Engineers. The machines included cranes, motor graders, rollers, scrapers, crawler and wheel tractors, distributors and ditchers. It appears that nightwork lights on construction equipment have definite advantages, in this type of work, over floodlighting. Among the advantages were: High-intensity illumination on the work; elimination of troublesome shadows; ability to adjust the lighting as needed; and the ability of a machine to be operated independently of the general illumination of the work area. A general shutdown, due to floodlighting unit failure, is also avoided.

Similar tests were also run by the Marine Corps Equipment Board.

Reports from the officer in charge of the tests indicated that: (1) Night work of the same quality as day work can be done with tractors and graders at 85 percent of the day rate. (2) No parts of the lighting systems were damaged during clearing operations. (3) The vibration of the equipment apparently had no effect on lamps or batteries, as only one lamp failed and the batteries were undamaged. (4) Equipment operators experienced no detrimental glare from the lights of other machines operating in the area. (5) Operators felt they could work with equal facility, day or night.

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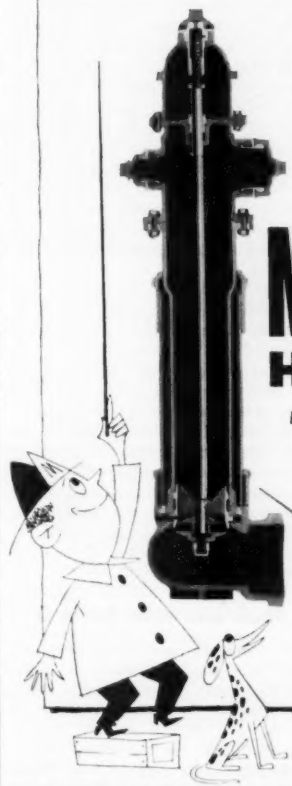

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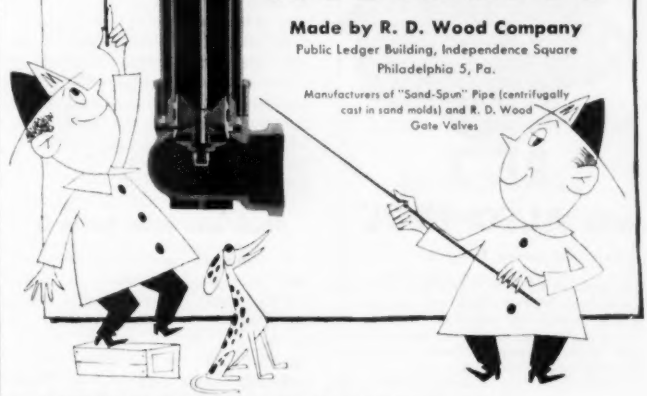

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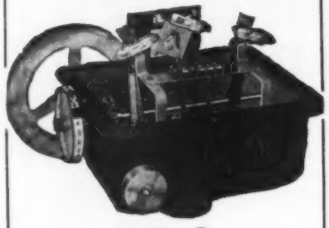

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JOINTING COMPOUNDS FOR SEWER PIPE

This material is based on a portion of a lecture by Raymond B. Seymour, Executive Vice President and Technical Director, Atlas Mineral Products Co., prepared as instructional material for water works and sewerage schools.

THE oldest and best known hot-poured joint is a filled asphaltic compound developed about 50 years ago. Compounds of this type are usually composed of equal parts of properly graded fillers and especially prepared asphalts. They have a specific gravity of about 1.5, a penetration at 77° F. of about 10 to 15 and a ball and ring softening point above 200° F. Hot-poured vitrified clay pipe joints are preferably constructed with primed bell and spigots. Priming is absolutely essential if the joints are poured under wet conditions. In the construction of the joint, it is of great importance that the surfaces be clean and dry and that the space between the bell and spigot be yarned with clean, dry jute. Two or more pipes may be joined on the bank in a vertical position and the hot compound poured without an asbestos runner. The runner, of course, must be used for all joints poured in the trench.

The hot-poured asphaltic composition is heated with stirring at 400–450° F. and when it flows freely is ladled out and poured in the joint at one pouring. The quantities of both jute and compound will vary with the type of pipe used. A close estimate of quantities can be obtained by multiplying the volume of the annular space by 0.056 to determine the weight in pounds of the compound required for each joint. Slide charts are also available for determining quantities of various sized pipes.

Bituminous Joint Qualities

A properly poured bituminous joint has good adhesion, is sufficiently dense, is chemically inert, has flexibility, solidifies quickly, is strong, will deflect without breaking the joint or the pipe, and is economical and easy to use. Properly poured asphaltic type joints have displaced Portland cement mortar joints almost completely and have proved to be most satisfactory over a period of years.

A hot-poured coal tar jointing material is also available. This material is claimed to possess superior root resistance but since it may lack adhesion, roots may grow between the pipe surfaces and the compound itself; and even in the absence of root growth, infiltration can occur at this interface. Another hot-poured jointing material is based on a hydrogen plastic and has excellent adhesion as well as outstanding root resistance. This product does not lose its adhesion even when soaked in water for long periods of time. Another type of hot-poured jointing material is based on a coumarone resin. This product, when used in the same manner as asphaltic and coal tar derivatives, is said to be root resistant.

Sulfur compound joints have been widely used for joining vitrified clay sewer pipe. Sulfur compositions are not as flexible as the asphaltic types but are more root resistant. Most of these compounds contain a bactericide in sufficient quantities so that they are not affected by sulfur bacteria.

High melting asphaltic type joints are also precast and used as rings on both the bell and spigot. The surfaces to be joined are painted with solvent just before the pipe is placed into position in order to secure a monolithic joint. This type of joint can be laid faster than any other type and can be installed under the most adverse conditions. In spite of the simplicity of the operation, it is sometimes difficult to secure good joints due to irregularities in the pipe and to damage of the collars on the spigot ends during storage and transportation. A slip-joint type asphaltic composition is most satisfactory on large jobs where the pipe is fairly uniform. The filled asphaltic compositions used in the slipjoint type joint usually have a ball and ring softening point of at least 240° F. and a penetration at 77° F. of between 5 and 10.

Neat cement joints are also used with vitrified clay pipe but are rigid and superior workmanship is necessary. Infiltration and root penetration can be prevented by

use of a metal collar such as the Weston gasket. The metal form is left on the pipe permanently when cement joints are constructed in this manner.

Trowelable Cements

There are a large number of cold trowelable cements which have been successfully used for bell and spigot joints but are more satisfactory for tongue-and-groove concrete pipe. Premixed and on-the-job mixed compositions are available. Since the former are factory blended compositions, they are considerably more uniform. However, since they harden by solvent evaporation, they do not set up satisfactorily under water. Trowelable compositions have some of the same drawbacks as neat cement, for example, good joints cannot be obtained unless superior workmanship is available. A good quality premixed caulking composition should contain a minimum of 40% inorganic material of which at least 30% should be asbestos fibre. The solvents should be balanced so that the product hardens uniformly and does not form a surface skin.

Another more recent development of the troweling type composition is made from blended synthetic rubber mixed with inert, acid-resistant amorphous asbestos and mineral fillers in the presence of a properly balanced solvent. Products of this type should contain at least 10% synthetic rubber, have an elongation of at least 15%, a specific gravity of 1.1 and be completely resistant to the ordinary acids found in the soil or in sewerage. Such compositions adhere tenaciously to vitrified clay, concrete and other ceramic surfaces and remain flexible from 40 to 125° F. These products are used primarily for jointing liner plates but are also used for jointing tongue-and-groove cement pipe.

The consistency of on-the-job mixed type products can be varied considerably but poor results are obtained if there is not close adherence to the manufacturer's directions. Close supervision is required to insure each mix being consistent. Since this type of material hardens by internal action and not necessarily by loss of solvent, the compounded product must be used within 45 min. after mixing. As previously cited for cement and factory-mixed caulking materials, workmanship for any troweling type material is of prime importance if satisfactory joints are to be obtained.

Solvents, Acids and Alkalies

Most of the previously described joints are satisfactory for domestic sewerage and mild industrial corrosives but are unsatisfactory for industrial wastes containing many varieties of solvents, alkalies and acids. In such cases, the jute packing may be impregnated with a quick-setting furfuryl alcohol-type cement and additional quantities of the freshly mixed cement are troweled at the base of the bell. Asbestos runners are generally applied in the usual manner and the joint is completed with a plasticized sulfur jointing compound as previously described. The heat of the hot poured jointing material helps to set the furfuryl alcohol-type cement but, of course, such cements will set in a matter of two or three days by chemical action, providing the temperature is above 60° F.

In spite of the many types of joints available and years of developmental work toward the improvement of pipe joints, the perfect sewer pipe joint has yet to be in-

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vented. The hot-poured asphaltic type sewer joint developed over 50 years ago is still standard. In spite of considerable work on plasticization and bactericides, many sulfur joints are made the same way as they were 30 or 40 years ago; and while modern troweling compositions are sometimes based on new synthetic rubber and plastics rather than asphalt, they still have the disadvantages inherent in joints formed by hand caulking methods. The standard jointing materials available today are certainly adequate but the leading manufacturers of pipe and jointing materials are nevertheless spending considerable sums of money on research. These firms will not consider their service to the water and sewer engineers or the welfare of the people of this country to be completed until they succeed in developing the perfect joint.

Erosion Control on Highways

The most successful erosion control methods have proved to be those which reproduce most closely conditions which are to be found on natural slopes. Mechanical or unnatural methods of control, while sometimes immediately effective, deteriorate with time and show up poorly in the long run as compared with methods that follow natural vegetative processes. By artificially speeding up the natural stabilization process, thereby creating conditions in one season which Nature could not duplicate in several years, the time required for complete control can be shortened.

Much of the value of slope stabilization is lost unless proper maintenance can be given during the all-important first and second years after installation, and as required thereafter. Cost of timely maintenance is not high, but neglect can bring about increased and unnecessary expenditures due to the necessity of cleaning gutters and repairing gullies which threaten the traveled way, and of frequently rebuilding portions of roadways at fill locations.

Highway construction standards now encourage the use of flatter slopes in erosion-prone soils. Flatter slopes allow the use of thicker blankets of topsoil which can support a more vigorous growth of vegetation without tending to slump when saturated. Control problems are eased considerably, and the need for maintenance reduced.

As new successful erosion control projects are completed and the consequent reduction in maintenance cost for repair of erosion-caused damage becomes more evident, highway employees are taking a greater interest in the program. Highway engineers have been particularly cooperative in developing methods which would be both practical and effective and highway maintenance forces have become more conscious of the value of prevention. There is still a decided need for continued educational work, however, especially in regard to effective methods for repair of old eroded slopes, and it is believed that eventually this work will be done as a matter of course.

Experimental work must be continued. Too many questions remain unanswered and too many partial failures result from high-intensity rains to permit the belief that the most effective methods have yet been developed.

The above are abstracts of articles in "California Highways and Public Works" and published in "Highway Research Abstracts."

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PUBLIC WORKS DIGESTS

THE HIGHWAY AND AIRPORT DIGEST

Corrugated Steel For Transverse Joints

Texas highway department this spring constructed a short project using a uniform thickness of 9 in. containing no metal except thin corrugated steel sheets forming transverse full-depth joints, and tie bars pressed into the concrete across a dummy centerline joint. The latter is standard Texas procedure, but this was the first experiment with the corrugated joint. This consisted of 28-gauge, galvanized corrugated sheets 8 in. wide installed vertical in freshly struck off concrete to a position ½ in. below the surface. These contraction joints are spaced 15 ft. apart. Expansion joints are provided at bridge ends. The corrugated sheets were pressed into place by means of a manual lever, aided by vibration from four electric vibrator units. It is believed that the corrugations will offer a degree of load transfer, even if the steel sheets rust away.

"Thin Corrugated Joints Tried Experimentally on Texas Concrete Road Job;" *Roads and Streets*, June.

Beach Sand Cement Roads

North Carolina in 1950 built on Ocracoke Island, one of the Outer Banks accessible only by ferry, a little over 2 miles of road. The only local paving material was beach sand containing a heavy mixture of shells. Heavy trucks cannot travel on the sand, and it is impracticable to get heavy equipment to the island. The decision, therefore, was to use a mixture of 94 lb. of cement, 280 lb. of beach sand and 7.8 gal. of water, laid with 6 in. uniform thickness to a width of 10 ft. (The total car population of the island is not much above 40.) The grading was done with two tractors with bulldozer blade and a 9 cu. yd. pan, and a pull grader. The concrete was mixed in two 2-bag mixers, one kept as a standby. Two 3 in. pumps furnished the water from well points set about 6 ft. deep. Beam test specimens 6 in. x 6 in. x 30 in. showed a flexural strength of 550 to 650 lb. per sq. in. at 10 days. There were no expansion joints or reinforcement, but surprisingly few cracks had developed at the completion of the project.

J. L. Morrison—"Ocracoke's Beach Sand Roads;" *PUBLIC WORKS*, July.

Effects of By-passes on Business

Shortening U. S. Route 50 in Sacramento Co., Calif., by 3.2 miles was effected by constructing a by-pass that missed, by several miles, the city of Folsom, through which it formerly ran. In Imperial, the highway passed through the main street of the business section and, to relieve traffic congestion, a by-pass was constructed through a parallel street only a block away. Each of these cities had a population of about 1700 and were similar in character, and a comparison has been made by the Division of Highways of the effects of these two different by-passes on the business of the two cities, respectively. The conclusions reached are as follows:

It is apparent in our analysis of the gross retail sales of the various classes of business in Folsom, that the through traffic contribution to the business volume of the various business classes was insignificant. Since the businesses such as service stations, cafes and bars showed increases above other retail businesses which had small chance of obtaining any of the heavy Sunday and holiday through traffic patronage, this fact is established. In the light of our previous studies, the fact that Folsom retail businesses other than cafes, bars and service stations showed only slight gains indicates that traffic congestion was no serious problem in the city.

The retail business volume analysis of Imperial businesses of all types, indicates that there was a slight increase in patronage following opening of the expressway, as compared to the county-wide average. Since the entire county had been very uniform in economic trends, these county figures provided an accurate measure of the by-pass effects on business.

W. Stanley Young—"By-Pass Effects: Consistent Pattern Developed by Division of Highway Studies;" *California Highways and Public Works*, May-June.

Asphaltic Concrete in The Holland Tunnels

The Holland tunnels between New York and New Jersey were paved with stone block in 1926-1927. By 1944, 4760 sq. yd. had to be repaired and another 7,500 sq. yd. in 1946. Foreseeing the necessity of ultimately replacing all the stone block, the engineers installed test sections of portland cement concrete, penetration macadam, hot-laid asphaltic concrete, and brick. The concrete was laid by the vacuum concrete process to permit use by traffic 6 hr. after laying, and was limited to 6 in. thickness by the structural features of the tunnel. Most of the slabs cracked. Penetration macadam was found to be unsuitable for the heavy traffic (18,000,000 vehicles annually, 35% of them trucks), and in 1949, when a survey showed that 20,500 sq. yd. of the pavement needed repairing, asphaltic concrete was selected, a test section of this material two years old having seemed to meet all expectations. In October 1949 a contract for using this for repaving the 20,500 sq. yd. was let for $137,202, this including the removal of the granite block in sections and replacing it between 8 p.m. and 6 a.m., the tube being open for traffic during the day. The pavement was laid in three courses: a binder course of mix No. II, Asphalt Institute specifications, an intermediate course of mix No. IV, and a wearing course of mix No. V. The

first two courses were placed during the same night, with a cooling period of at least 3 hr. between. The top course was not placed until traffic had used the first two courses for at least 12 hr. The Supt. of Structural Maintenance of the tunnel reported in June: "After nearly two years of service, during which millions of vehicles—confined to the same wheel lanes—had passed over it, more than 7,400 lin. ft. of asphaltic concrete roadway in the Holland Tunnel has shown little or no wear."

The specifications called for mixes as follows: Base course, voids 2.45%, stability (Hubbard-Field method) 5,000. Intermediate course, voids 2.4%, stability 5,800. Top course, 2.1% voids, stability 5,600. To insure this, screen analysis of each stone bin was taken twice each night. The asphalt cement was tested at the refinery and again at the plant. An inspector checked the batching of each mix, and samples of the mix were taken each night. The asphalt was placed on the roadway at temperatures varying from 275° to 300°.

Alvin L. Ruefer—"Holland Tunnels Provide Tough Test for Asphaltic Concrete;" *Engineering News-Record*, June 28.

Why Wider Right-of-Way

"What is the most compelling reason for obtaining wider right-of-way on old country roads when a highway department is getting ready to rebuild them?" A number of county engineers, being asked this question, gave various replies; one saying: "There can be as many compelling reasons as there are roadway problems resulting from inadequate widths, and the reasons will vary in different parts of the country." Totaling the number of times a given distinct advantage, or related group of advantages, was mentioned in the replies, it was found that 25% of the reasons given were "On a wide right-of-way a road can be reconstructed with an elevated grade line and a streamlined cross-section, reducing the problem of snow removal and providing space for snow storage." Twenty-two percent were: "On gentler slopes it is easier for vegetation to get started, and the roadside is subject to much less damage from erosion." Two groups tied for third place, with 11% each: "With a wide right-of-way and a modern cross-section, surface drainage is improved"; and —"The modern road on an ample right-of-way is a safer road, with improved sight distance, flat slopes to run off on if necessary, and other advantages". Nine percent: "mowing, ditch cleaning and other roadside maintenance operations are much easier to do," (although several said there is a larger roadside area to mow and keep clean). Five percent said better grades can be laid; 4% that it is much easier for farmers to maintain their fences.

"Stand Firm on Sufficient Right-of Way Width;" *Better Roads*, June.

Testing Traffic Paints

Los Angeles, Calif, with 5,700 miles of streets, purchases 65,000 to 100,000 gal. of traffic paint a year. Its Bureau of Standards analyzes the paints offered, and also subjects them to various tests. Stripes of the different paints are laid down on the pavement at a busy intersection for actual street wear. At the laboratory they are tested for drying time, viscosity, percentage of water, dry and wet opacity, daylight reflectance, flexibility, bleeding and stability. Samples 0.005 inch thick

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on a tin plate must dry to the touch in 5 to 30 min. and be hard in 50 min. Samples dried and baked and bent over a ½ inch rod must show no cracking. Examined in a special reflectance-measuring device, samples must reflect a minimum 80% of light from a 500-watt bulb. Painted over a black-and-white-striped chart it must reflect at least 88% as much light from that over the black as over the white stripes. Recently the bureau has adopted a laboratory wear test, using wheels with smooth rubber tires and weighted with 67 lb., which are revolved over paint applied 0.005 inch thick on a glass base. The paint must withstand 800,000 revolutions (which are completed in about two days of constant running); which will probably be increased to 1,500,000. They aim to correlate the number of revolutions with actual street wear. The weathering test consists of dipping samples (on steel plates) into distilled water every 4 or 5 minutes, and letting them dry between wettings, during a 28-day test period. Inferior paints crack, peel and slough off within 10 days.

James Joseph — "$350,000 Traffic Paint Bill Leads to Tests by Los Angeles;" *American City*, July.

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Stand Firm on Sufficient Right-of-Way Width. June, Pp. 23-24, 39.

Make Equipment Serve You Best. By *J. C. Moore*, Dist. Engr., Kentucky Dept. of Highways. June, Pp. 27-29, 35.

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By-pass Effects. By *W. Stanley Young*, Right-of-Way Agent. May-June, Pp. 27-31.

Progress and Records in Pavement Construction During 1950. By *Carl Alzueta*, Asst. Engr., Construction Dept. May-June, Pp. 32-38.

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Culvert Is Floated and Sunk to Grade. June 21, P. 41.

Holland Tunnels Provide Tough Test for Asphaltic Concrete. By *Alvin L. Ruefer*, Supt. of Maint., Port of N. Y. Authority. June 28, Pp. 41-42.

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Ocracoke's Beach Sand Roads. By *J. L. Morrison*, Univ. of North Carolina. July, Pp. 42-43, 75.

Grid Roller Reduces Road Salvage Time. July, P. 47.

Roads and Streets

Better Welding for Better Equipment Maintenance and Repair. By *G. L. Wiley*, Welding Specialist, Texas H'way Dept. June, Pp. 39-43.

Thin Corrugated Joints Tried Experimentally on Texas Concrete Road Job. June, Pp. 44-45.

How to Design a Prestressed Concrete Tee Beam. By *V. J. Brown*, Assoc. Editor. June, Pp. 47-54.

Pennsylvania Procedure and Results in Asphaltic Concrete Job Control. By *W. H. Herman*, Chf. Research Engr., Penn. Dept. of H'ways. June, Pp. 67-80.

Notes on State Practice in Asphalt Undersealing. June, Pp. 81-89.

New Airborne Construction Equipment Being Groomed by Military Engineers. June, Pp. 92, 94.

The Surveyor

Lighting and Signposting of Roads. By *John Clapp*, Boro Engr., Camberwell. June 30, Pp. 417-418.

Training Soldiers in Dirtmoving

Under a contract with the Army, Caterpillar Tractor Co. will give basic training to armed forces personnel in earthmoving principles and construction equipment application. The contract, at no cost to the government, involves the use of equipment and of such training aids as illustrated charts, movies, instruction kits and earthmoving calculators. At Fort Leonard Wood, Mo., about 300 men received training including 16 hours of classroom work and 8 hours of equipment demonstration. Courses one to three weeks long will be given at 14 Army installations. Personnel taking the instruction will include combat, construction, heavy equipment and aviation engineering.

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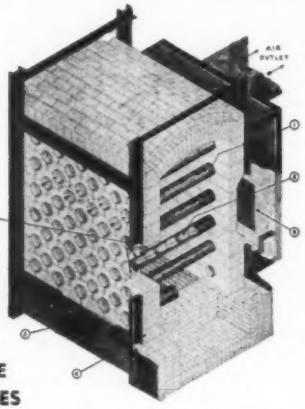

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PUBLIC WORKS ENGINEERING DATA

Sludge Treatment and Disposal at Richmond-Sunset Plant

The total flow of sewage at the Richmond-Sunset treatment plant, San Francisco, for the fiscal year ending June 30, 1950, was 4,487 million gallons This had an average SS of 280 ppm and a BOD of 270 ppm. Raw sludge pumped to the digester amounted to 25.8 mg, having a total solids content of 4.06%.

There was withdrawn from the digesters 8.4 mg of digested sludge. That drawn from the primary had a solids content of 2.65% and that from the secondary 5.16%; average volatiles were 61.3%; and average alkalinity 1,640 ppm. The total solids of the sludge applied to the filters was 4.45%; the filtrate contained 0.29% solids. Ferric chloride dosage averaged 3.09%; rate of filtration was 3.53 lbs. of dry solids per sq. ft. per hour; and the filter cake moisture content was 70.3%.

Two stage elutriation is used in this plant, resulting in an increase in solids content of the sludge from 3.30% to 4.45%, and in a reduction in alkalinity from 1,640 ppm to 400 ppm.

Bid Prices on Sanitary Sewers in Texas

Five bids were received for construction of Unit 3 of the Sycamore Creek-Baptist Seminary sanitary sewer, Forth Worth, Tex. Bids were received June 21. Bids totalled as follows: (1) Steed Constr. Co., $62,338; (2) Lewis & Lewis, $68,736; (3) H. W. Holtzer, $72,405; (4) F. S. Oldt Co., $73,865; and (5) Glade Constr. Co., $76,051. Unit prices for the three low bidders are given herewith; "c" indicates a cradle was required:

Size	Length	Depth	(1)	(2)	(3)
10" c	211	0-4	$2.20	$2.20	$2.46
10" c	2109	4-6	2.20	2.30	2.56
10" c	2057	6-8	3.00	2.50	2.75
10" c	537	8-10	3.00	2.70	3.11
10" c	145	10-12	4.00	3.20	3.42
10" c	30	12-14	4.00	4.20	3.97
8"	2014	4-6	1.39	1.45	1.59
8"	2328	6-8	1.44	1.60	1.77
8"	515	8-10	1.60	1.80	2.00
6"	12402	4-6	1.28	1.30	1.50
6"	3633	6-8	1.40	1.40	1.69

Length is in feet; depth is in feet. There were 57 manholes, 4-ft. diameter and 5-ft. standard depth. Bids were, in order above, $125, $125 and $130 each, with $20, $18 and $20 for each foot depth in excess of standard. Rock excavation extra was bid per cu. yd. as follows: $6.50, $5 and $5, and loose rock $0.02, $5 and $1.50. Wyes in place were bid (1) $0.50; (2) $2.50; (3) $2.

Narrow Median Strips on Highways

A committee of the Highway Research Board has obtained from seven state highway departments their experiences with narrow median strips on divided highways, a narrow strip being defined as one having a width of 8 ft. or less. These reports describe 23 sections, which can be classified as: 1—Those with raised barrier curbs; 2—Sloped or rounded mountable medians; and 3—Those that are flush with the pavement, delineated only by markings. These designs varied with highway conditions, which were classified as: 1—Rural divided, without control access; 2—Major streets through residential or suburban areas; 3—Major streets through business areas or with ribbon commercial developments; 4—Long structures or elevated highways; and 5—Expressways.

Of the 23 narrow medians, 11 were built of concrete (one surmounted with a 5-inch pipe) 2 were of bituminous construction; 7 were grassed; 2 were of metal; and one was a 6-inch stripe. The concrete medians varied in width from 1 ft. to 4 ft. and in height from 2.5 ins. to 19 ins. The bituminous medians were 3 ft. by 6 ins. high and 4 ft. by 5 ins. high respectively. The grass medians ranged in width from 4 ft. to 42 ft., for one special case, and their curb height from 4 ins. to 7 ins., except for the one 42 ft. wide, which had no curb. Concrete curbs are found in each of the five highway classifications, grass in the second, third and fifth. The costs per foot varied from 33 cents for the 2-ft. by 2½-inch concrete in Ohio in 1940-50 to $5.74 for concrete, 2½-ft. by 16 ins. high in New Jersey in 1949.

Accident rates (per 100 millions vehicle miles) were reported for ten of the 23 highways. The lowest rate was 54 for a bituminous median, having a double stripe adjacent to it, on 0.42 mile of class 4 highway in California. The highest rate reported was 970 on 0.34 mile of the Merrit Parkway in Connecticut, where the median was 4 ft. wide with an 18-inch metal curb; but in spite of this high rate, there were no fatalities. The average speed rates on these two highways were the highest of any reported—49.1 mph for the lowest accident rate and 46.0 mph for the 970 rate.

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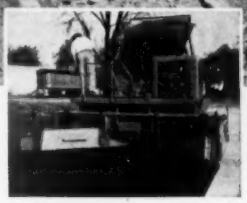

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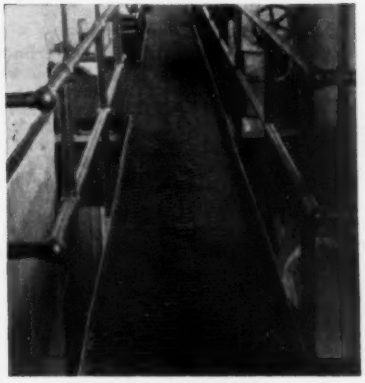

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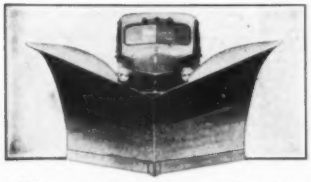

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The average daily traffic on the two, also, was nearly the same—17,800 and 18,000 vehicles daily; and each had two 13-ft. lanes. The section with the highest rate of accidents was a bridge over the Housatonic River; that with the lowest rate was Broadway, through the central business area of Oakland, Calif.

New Well has Diesel Standby Engine

A new 600-ft. well recently completed by Kerrville, Texas, supplies 1,000 gpm through a 16-inch casing from the 120-ft. level. Normal daily requirements for this city of 11,000 is about 700,000 gpd and the eight wells now in service have a total capacity close to 3 mgd. The new well is served with an electric motor driven pump with a 180-hp International diesel engine for standby. The standby engine can handle the entire pumping job if electric power fails.

County-Wide Radio Network

Cooperative action by nineteen public safety agencies in Lake County,, Ill., has created a county-wide radio network linked by a master receiver and transmitter located near Libertyville. Selective coded controls permit cutting in or cutting out all communities not concerned with specific messages. In order to provide for emergencies, when power might fail, stand-by power is provided from a 10-kw Kohler electric generator driven by a gasoline engine. This goes into service automatically when power fails. Each community pays its share of the cost of the entire system.

Regulates Industrial Waste

Charlotte, North Carolina, has adopted an ordinance to regulate disposal of industrial wastes. The ordinance requires all firms that discharge more than 40,000 gallons of sewage per day to maintain storage tanks that will hold 80 per cent of the normal volume so that sewage flow can be equalized over a 24-hour period. Certain types of waste may not be discharged into the sewerage system, and all those who use the city sewers for industrial waste must obtain a permit to do so. Discharge outlets must be equipped with volume flow meters and charges for use of the sewers are based on the kind and quantity of the waste.—*Public Management.*

PUBLIC WORKS DIGESTS

THE SEWERAGE AND REFUSE DIGEST

Sewer Clogging by Greasy Industrial Wastes

Wastes produced by the A. Rooke Cooperage Co., located in Los Angeles Co., Calif., have a high alkalinity (pH is 11) and high grease concentration. They are passed through a conventional grease trap, but a considerable portion of the grease remains in an emulsified state and adheres readily to the sewer that removes the waste. It was found that mixing with the waste water 6,000 to 8,000 ppm of alum for a period of 40 minutes caused flocculation of the grease, which then did not adhere to the sewer walls, was readily transported by the sewage, and was removable by sedimentation.

Harvey F. Ludwig — "How to Flocculate Greases so They Won't Clog Sewers;" *Engineering News-Record*, July 5.

Wastes Survey for Designing Disposal Plant

New York City is engaged in a sewage disposal program for treating essentially all the city's wastes in 18 plants. Some of the drainage areas are largely domestic with only a few industries; the sewage from others will be contributed largely by industries, and their wastes may appreciably affect the volume of flow and the concentration of polluting matters, and may contain toxic matters inimical to biological treatment. Most industrial wastes can be treated suitably by grit removal, sedimentation, either activated sludge or chemical coagulation, and digestion. A combination of certain wastes may be more amenable to treatment than some of them alone, because of dilution of toxic material, neutralization of acid or caustic wastes, mutual flocculation of colloids, or breaking of emulsions, and the addition of organic matter which may more readily support biological flocs. A survey of the industrial wastes of each area is therefore necessary for a wise choice of type of treatment.

An ideal wastes survey would provide data for estimating the volume to be treated (maximum, minimum and seasonal); suspended solids concentration and B.O.D.; corrosive character; presence of heavy material liable to settle in sewers or grit chambers; toxic effect on biological processes; presence of mineral oils, grease or detergents; immediate O.D. due to sulfides, sulfites, etc.; the settleable fraction and the colloidal fraction; density of sludge produced, its dewatering characteristics of and amenability to digestion; effect on chemical dosage requirements and on terminal chlorine demand; effect on the receiving stream (grease slick, dye colors, etc.); possible interference with control tests; and mutual effect of the various wastes on one another and when mixed with domestic sewage.

In sampling wastes, consideration must be given to seasonal processes (as for ice cream), peak flows, use of private water supplies, and other affecting features.

Robert Shapiro—"Industrial Waste Investigations in New York City;" *Sewage and Industrial Wastes*, June.

Death in a Sewer Manhole

On October 10, 1950, two workmen died immediately on descending into a sewer manhole 26 ft. deep, and two others attempting rescue were unable to climb out. The manhole was at the lowest end of a section of new sewer which had received no sewage and was not connected to any sewer that was in service, and contained ground water to a level above both inlet and outlet pipes. Analysis of the air at the bottom of the manhole showed no poisonous gases, but only 7% oxygen. Death was attributed to lack of oxygen, but what caused that? Investigation of all conceivable possibilities suggested only one probability: that the oxygen depletion was due to either a dilution with soil air, which would be predominantly nitrogen at this depth and could enter through the manhole wall (which was far from airtight), or diffusion of the oxygen through the masonry wall into the surrounding soil, the organic content of which is high. Moral: Never enter a manhole or other underground structure that is not well ventilated, without first testing the air.

G. J. Raschka and W. J. Uber—"Oxygen Depletion in a Sewer Manhole;" *Sewage and Industrial Wastes*, June.

Sewage Treatment by Ultrasonic Vibrations

The author suggests the possibility of using ultrasonic vibrations in several ways in treating sewage, without claiming that they would be economically practicable. Such vibrations have produced emulsions of immiscible liquids; promotes coagulation; and bacterial content of sewage has been reduced over 80% after 6 minutes irradiation. Vacuum filters might be made more efficient by irradiation in such a manner as to orient particles in a plane perpendicular to that of the filter. Its use for accelerating oxidation reactions does not seem practicable.

R. D. Coleman and H. B. Gotaas—"Ultrasonic Vibrations in Sewage Treatment;" *Wastes Engineering*, June.

Sewer Rentals In Pennsylvania

Of the 328 municipalities in Pennsylvania, 63 charge the users of their sewers for the service, using one of six bases for calculating the rentals, or a combination of two or more. One third of them base charges on water consumption; one third on the number of types of plumbing fixtures, in some cases modifying the rate according to the character of the building. Eleven use a flat rate; 6 base it on the type of property; 2 on the number of sewer connections, and 2 on the

number of rooms. The flat rate, number of sewer connections, type of property, and number of rooms are used only by places of 10,000 population or less. Charging by water consumption may not be practicable where the water is furnished by a private company. Collection of rentals may be enforced by means of penalties, liens, civil suits, disconnecting the sewer, or (when based on water consumption) disconnecting the water. Of 51 municipalities reporting on this point, 33 use the lien method, 7 disconnect the sewer, 3 institute civil suits, and 8 find penalties alone sufficient.

"Sewer Rentals in Pennsylvania;" *Wastes Engineering*, July.

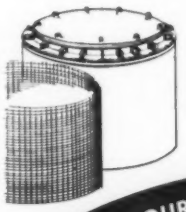
A South African Problem in Pipe Corrosion

The municipality of Springs, South Africa, found in 1950 that, of 32,600 ft. of 15" and 18" concrete sewers, 17,200 ft. was badly corroded, and 6,1000 ft. partly corroded but the reinforcement not exposed. There was no corrosion in the invert, two deep indentations at the average flow level, and the severest corrosion at the top—sometimes actual perforation. Investigation showed several other towns similarly but less seriously affected. In most cases the most serious corrosion was in the sections with the best ventilation. The only factor which was common to all the towns was turbulence. The worst conditions were found near the outfall end of the sewer and below the point of entrance of pumping mains; and at the down-stream sides of all manholes the corrosion was greater than up-stream from them. The town engineer suggests that, as there is no corrosion in sewers running full, some plan be devised to have all sewers always running full; or to prevent the access of fresh air to them. Incidentally (or perhaps more importantly) the municipal area contains many gold mine dumps which contain large amounts of iron pyrites, and all the water courses are acid with pH values of 2 to 3, and are free of any bacteria.

A. J. Archibald—"Failure of Concrete Pipe Sewers;" *South African Municipal Magazine*, May.

Composting in The Netherlands

In 1929 the Refuse Disposal Company, a semi-governmental body whose shares are held by the Netherlands government, began making a compost of the refuse of the Hague for use to fertilize the moorlands. To this use there later was added use as fertilizer on tillage and grasslands, present practice being an average of 4 or 5 tons per acre per year. The original plant now produces about 120,000 tons of compost per annum. In composting, the refuse is thoroughly wetted with bacilli-bearing water and fermented for 4 to 6 months; metals and bones first being removed, the ferrous metals by magnet. The refuse of 700,000 population is processed with a force of only 55 men, including the technical staff. The compost is sold at 77 cts. per ton at the factory, and the cost of freight to land averages about $1.00 a ton. The metals recovered bring in additional revenue; and the towns pay 90 cts. per capita per year for this disposal of their refuse. These combined incomes make the industry self-supporting. The agriculturists in the sandy districts in the middle and south of the country have insisted upon the foundation of a similar plant there, and the company will receive $2,800,000 of Marshall aid to finance it. If and when other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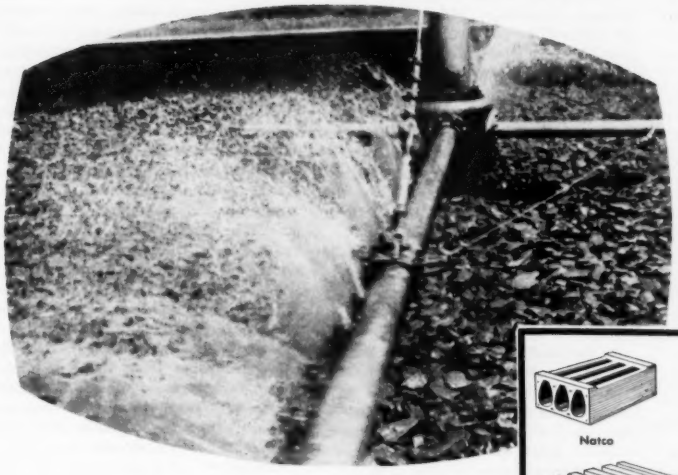

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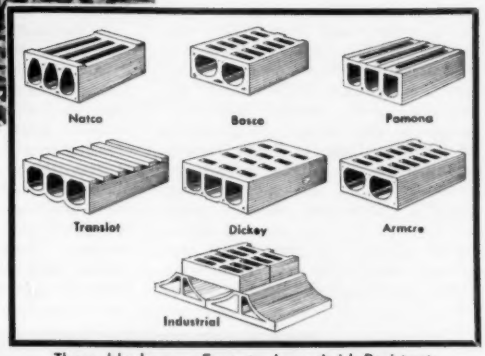

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projected plants are established, the waste products of a fourth of the whole Dutch population will be so processed. The compost averages 4.5 to 12% useful organic substance; 0.4 to 0.5% total nitrogen; 0.4 to 0.5% phosphoric acid; 25 to 30% moisture, and small amounts of potassium, calcium, magnesium and carbon dioxides; copper and other metals.

W. A. G. Westrate—"The New Dutch Scheme for Refuse Disposal;" *The Surveyor,* June 16.

California Regulates Irrigation with Sewage

The use of sewage effluents for irrigation of fodder crops in the arid sections of California is encouraged by the State and local health departments. Of a total of 50 places practicing this, 20 are in the southern San Joaquin Valley, these including every sewage treatment works in this section. Regulations of the State Dept. of Public Health prohibit the use of raw sewage on growing crops, and provide that partially disinfected effluents shall not be used to water growing vegetables or fruits in contact with the ground, but can be used on nursery stock, cotton, hay, fodder corn, sugar beets, etc. Effluents which meet the bacterial standards established for drinking water may be used without restriction. Milch cows are not allowed to pasture on land irrigated with sewage nor to have access to ditches carrying sewage effluents. Surface streams with slight and intermittent sewage pollution are used for irrigation in a few places, it being believed that there is only a negligible hazard or none at all in such case.

E. A. Reinke—"California Regulates Use of Sewage for Crop Irrigation;" *Wastes Engineering,* July.

Wastes Research by Lawrence Experiment Station

At the Lawrence Experiment Station of the Massachusetts Dept. of Public Health, work in regard to treatment and disposal of industrial wastes has been carried on since at least 1895. With the increasing importance of the problem of disposing of the wastes reaching Massachusetts streams, the Department has found it necessary to investigate over 40 varieties of wastes. These include laundry wastes, paper wastes, those from chemical plants, tanneries, wool scouring, dyeing, fish handling, and breweries. Trickling filters were found to be effective in reducing B.O.D. for most wastes. Even where these are high in content of both organic and inorganic acid it is possible, by careful training of bacterial flora, to obtain surprisingly good B.O.D. removal, even if there are present metals normally considered toxic, provided the material applied be maintained at a relatively constant level of contaminants. This applies to the presence of very considerable amounts of phenols and cyandies. In many cases it is economical to remove grease, tannery wastes, etc. and neutralize acidity to relieve the load on filters. Some wastes, however, it seems impracticable to treat on filters. Among these is waste from the manufacture of cigarette paper, for which the only solution found is evaporation and burning. Wastes from fish industries contain odorous materials; chlorination does not remove the odor—even produces worse ones, and the most economical remedy found is to burn the vapors.

Joseph A. McCarthy—"Half Century of Wastes Research at Lawrence Experiment Station;" *Wastes Engineering,* July.

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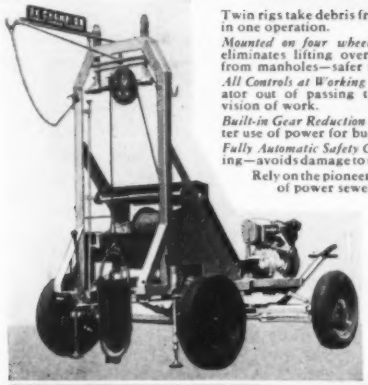

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Relation Between B.O.D. and Oxygen Consumed

Oxygen consumed methods and the B.O.D. test are two distinctly different parameters, one indicating biological and the other indicating chemical oxygen requirements, which have no *a priori* intrinsic relationship. An oxygen consumed method can be used advantageously with those wastes that contain materials toxic to biological action, or if it is desired to learn the approximate chemical oxidizability of a given waste. In domestic sewage from which the settleable solids have been removed, a satisfactory correlation can be obtained between the oxygen consumed and 5-day B.O.D. In streams receiving domestic sewage, the O.C./B.O.D. ratio increases as the stream becomes increasingly stable biologically. Where a given industrial waste is fairly constant in composition and contains no toxic materials, a satisfactory O.C./B.O.D. ratio may be determined. In such cases, the oxygen consumed test, with occasional checks against B.O.D., may be used for control purposes in the treatment of the particular waste.

W. Allan Moore and C. C. Ruchhoft—"Chemical Oxygen Consumed and Its Relationship to B.O.D.;" *Sewage and Industrial Wastes*, June.

Decontamination of Contaminated Vegetables

Although growth of vegetables on contaminated soil appears to cause little contamination of them that is not easily prevented or eliminated, it may be desired to reduce this little by some process of decontamination, or to decontaminate vegetables of unknown origin. The authors studied six methods of effecting this: storage, washing with plain water, or with detergents, or with germicidal agents, use of chlorine gas, and application of heat. Previous studies (see *Sewerage Digests* for May and June) have shown that the death rate of coliform bacteria under the ordinary conditions of vegetable storage is slow and does not insure adequate decontamination. Vigorous washing for 15 min. with plain water removes most of the sprayed-on contaminants, but does not remove coliforms from tomatoes grown on polluted soil. In general, vigorous washing with anionic, nonionic, and cationic detergents is not materially better than washing with plain water. Chlorine and its compounds in high concentrations in solution do not remove organisms protected by dirt or in cracks, crevices or bruises. Chlorine gas is a good decontaminating agent but causes bleaching in the concentrations required. Nitrogen trichloride and t-butyl hypochlorite are not effective in the cencentrations normally used for fruit spoilage control. The most effective method for consistently obtaining a low coliform residual, without affecting the appearance and condition of the vegetables is soaking them in water at a temperature of 60° C (140° F) for 5 minutes.

Willem Rudolfs, Lloyd L. Falk and Robert A. Ragotzkie—"Bacterial Decontamination;" *Sewage and Industrial Wastes;" June.*

Treating Industrial Wastes

At the 23rd Annual Meeting of the Federation of Sewage and Industrial Wastes Assns., seven engineers discussed the subject "Pretreatment for Recovery of Usable Products". Although several instances were cited where useful materials were recovered by pretreatment, all agreed that such possi-

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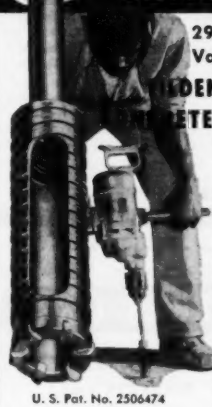

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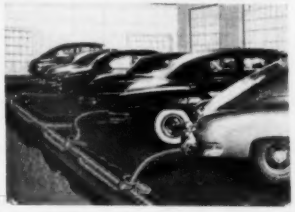

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bilities were very limited. Even should a single company find this profitable, should many others follow suit they might so flood the market and lower the price as to remove all profit. It is becoming increasingly necessary for industries to treat their waste waters before discharging them into streams, and in some cases recovery of usable products, though not in itself profitable, may reduce the total net cost of treatment. In many cases, study of plant processes and operations have revealed methods of reducing the *amounts* of wastes requiring treatment.

Seven engineers discussed the subject of "Treatment of Industrial Wastes with Domestic Sewage." All agreed that it was possible so to treat industrial wastes having a high content of organic solids in suspension if the sewage treatment plant be of adequate size; but several qualifications were mentioned. If the wastes contain acids, alkalies, toxins or abrasive particles, they may be detrimental to or unnecessarily complicate sewage treatment or sludge disposal. In many cases the industry should be required to prevent shock loads, as by installing holding and reaction tanks; or to reduce the B.O.D. to a given limit. One city also set a limit to the nitrogen content. One engineer called attention to the necessity of frequent inspection of pretreatment plants installed by industry to see that they were operated effectively. It was generally agreed that industry should pay a share of the cost of installing and operating a plant for treating sewage into which they discharge wastes, but there was some difference of opinion on how much to charge them. This is especially difficult of solution for a small municipality, many of whose citizens are employed by the industry. The cost of treating the wastes might exceed that of treating the sewage alone, but the loss of the plant (if it threatens to move) might be a much greater financial loss to the municipality (in both taxes and wages to employees), and arbitration rather than arbitrary action seems advisable.

"1950 Industrial Waste Forum;" *Sewage and Industrial Wastes*, June.

Twin Inverted Siphons at Wilmington

The plans for the $13,000,000 combined city-county sewerage project for Wilmington and the surrounding areas of New Castle County, Del. (see *Sewerage and Refuse Digest* for January, 1951), contain several interesting and unusual features. One of these is the method of constructing two inverted siphons, one to carry a maximum of 18.3 mgd across the Christina River, the other to carry a maximum of 132.5 mgd across Brandywine Creek. For the former, two 24" cast iron pipes will be provided. One of these pipes will carry flows up to 12 mgd at velocities up to 5.9 fps; and when the flow exceeds this it will pass over a weir and place both pipes in operation. In the Brandywine siphon, flows up to 75 mgd will pass through one 54" pipe with velocities up to 8 fps, and for higher flows, a remote control device in the sewage pumping station will operate to place both siphon pipes in service. When the flow decreases the remote control device will automatically return the siphon to "one pipe" operation. An electrically controlled sluice gate in the inlet chamber will induce a flushing velocity of 9 fps through either pipe when necessary.

A. R. Vollmer—"Sewage Works Program of Wilmington, Delaware;" *Wastes Engineering*, July.

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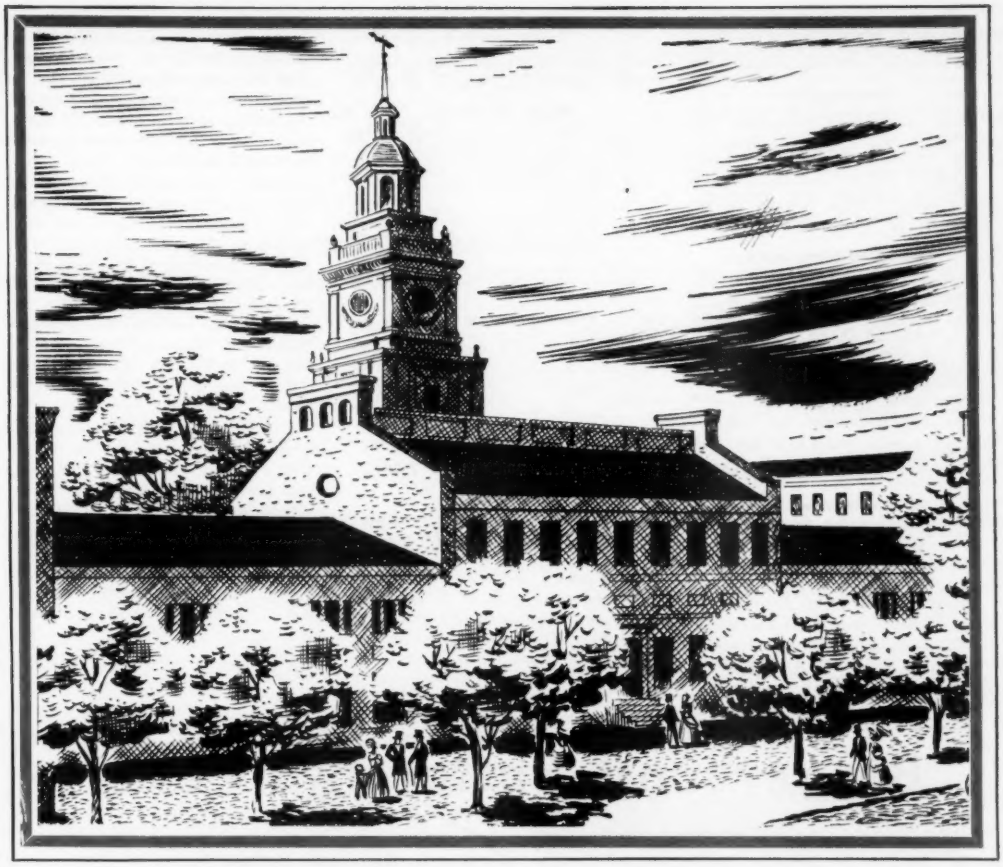

Philadelphia's Independence Hall, where the Liberty Bell is housed, as it looked 100 years ago

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Composting. By J. C. Wylie, Co. Engr. Dumfries, Scotland. June 16, Pp. 373-374.

Future of Sewage Disposal in South Africa. By *E. J. Hamlin and H. Wilson*. June 23, Pp. 397-398.

Bio-Aeration: Experimental Work at Sheffield. By *James H. Edmondson*, Gen'l Mgr., Sheffield Sew. Disp. Dept. June 30, Pp. 411-413.

Wastes Engineering

A Dozen Sewer Design and Installation Suggestions. By *Fred S. Cresswell*, Mgr., Nat'l. Clay Pipe Mfrs. July, Pp. 362-364.

California Regulates Use of Sewage for Crop Irrigation. By *E. A. Reinke*, Chf., Bur. of San. Eng., Cal. Dept. of Pub. Health. July, Pp. 364, 376.

Half Century of Wastes Research at Lawrence Experiment Station. By *Joseph A. McCarthy*, Chf. of Laboratories. July, Pp. 367-369, 386.

Sewer Rentals in Pennsylvania. July Pp. 370-371, 388.

Graphic Method of Sewage Flow Analysis. By *Moshe Markuze*, Hydr. Engr., Haifa, Israel. July, Pp. 372-373.

Water & Sewage Works

Treatment of Distillery Wastes. By *C. T. Carson*, V. P. Hiram Walker & Sons. July, Pp. 312-317.

Sewage Works Program of Wilmington, Del. By *A. R. Vollmer*, Cons. Engr. July, Pp. 318-324.

Municipal Services in Fringe Areas

Six basic urban services—drainage, fire protection, police protection, sewerage, streets, and water supply—were all inadequate in areas annexed to 34 of 75 reporting cities, and these annexing cities will have to make considerable financial outlays to bring the poor facilities up to standards maintained within their own limits. City officials are practically unanimous (66 of 74) in believing that in the immediate future the area will cost more than it will return in revenues. However, four-fifths of them (58 of 71) agree that over a long period of time the area will pay its own way.

Many cities thus find themselves in a serious dilemma: shall they annex troublesome fringe areas at a time when they are confronted with difficult financing of city-wide services or shall they ignore the growth of their fringe and hope that the results will not be too serious? Numerous municipalities are following the first alternative, but a number are holding to the policy of hopeful deferring.

The public service that was most frequently adequate in the fringe was water supply. Police protection was next in sufficiency, followed by streets, drainage, fire protection and sewerage. Only Cincinnati, Amarillo, and Thomasville (Georgia) absorbed fringe areas in which all six of the fundamental services were suitable. Although water and sewerage rated first and last, respectively, in adequacy, they each were named almost twice as often as

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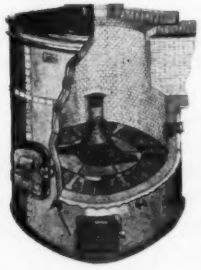

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any other service in terms of the need most influencing the fringe to annex.

Apparently the currently adequate water supply in many fringes was either expected to dwindle in the foreseeable future or it was going to become quickly insufficient for a mushrooming population. Other deficiencies which prompted the fringe to want to annex were, in order of frequency, fire protection, police protection, streets, schools, drainage, garbage collection, power, and zoning.

These data are from an article by John C. Bollens, University of California, Los Angeles, in Public Management and in the Municipal Year Book.

NEW YORK FLUORIDATION POLICY and PROCEDURES.

FLUORIDATION of public water supplies is recommended by the New York State Department of Health, subject to the provision of adequate control measures governing its application. This policy is based on the encouraging results of the Newburgh-Kingston study which indicated a marked reduction in dental defects among children.

The requirements of the New York State Department of Health provide for a written application accompanied by an engineering report; accurate feeding equipment; protection for the operator; and adequate control of the treatment process by means of laboratory tests. In addition, definite support for the fluoridation program must be obtained from the local health officer and he must also establish a program for collecting water samples and having them analyzed. A responsible operator must be provided and he must be trained in fluoride concentration tests.

This article is based on the official announcement of the Department. In the discussion accompanying the regulations, considerable space is devoted to the fluoride compounds that may be used and the equipment for applying them. Heretofore, commercial sodium fluoride has been largely used because it is convenient, readily soluble and its toxicity and physiological effects have been thoroughly studied. Since the expanded use of fluoride compounds in the defense program is leading to a reported shortage of sodium fluoride, attention is directed to sodium silicofluoride as a substitute. This is reported to be available in adequate quantity for all water treatment needs.

Commercial sodium fluoride contains 90% to 95% sodium fluoride by weight, and at least 41% to 43% fluoride ion by weight. The weight of this material varies from 38 to 90 pounds per cubic foot. It may be in the form of a very fine powder (the lighter forms) or a coarser material (which is heavier). The concentration of fluorine and the weight per cubic foot are important in the selection of feeders and specifications for the material to be used are necessary in planning to purchase a feeder.

All of the grades of sodium fluoride are soluble in water to the extent of about 4%; that is, 4 pounds of the material will dissolve in 100 pounds of water. Ordinarily solutions of 1% to 2% will be used;

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however, equipment is available for feeding a saturated solution from the granular grade of sodium fluoride. This permits a concentration of 0.34 pound per gallon of saturated solution at 60°F. With this concentration, 58.5 gals. of solution will treat 1 mg at 1 ppm of fluoride ion. A 1% solution requires 234 gallons. The pH of the 1% solution is 6.5 and of the saturated solution is 6.0. In any case, 19.3 pounds of sodium fluoride will be required for a dosage of 1 ppm fluoride ion in 1 mg.

Two grades of sodium silicofluoride are available, the regular grade weighing 72 pounds per cubic foot and the lighter grade, which weighs 55 pounds. The commercial product contains 60% of the fluoride ion by weight. The solubility is low, being 0.43% at 32°F. water temperature and 0.62% at 60°. Large volumes of solution are therefore necessary. For instance, 668 gals. of 0.25% solution will be necessary to treat 1 mg at the rate of 1 ppm fluoride ion. In order to avoid handling such a large amount of solution, a slurry of 10% to 20% may be used.

About 14 pounds of sodium silicofluoride with a purity of 99% and a fluoride ion content of 60% will be required for each part per million treatment per million gallons of water. The pH of the saturated solution of sodium silicofluoride is 3.5, but a saturated solution is not normally used.

Storage and Feeding

Both sodium fluoride and sodium silicofluoride can be purchased in 100-lb. paper bags, in fiber drums holding 100 to 125 lbs., and in paper-lined wooden barrels holding 375 to 425 lbs. Neither chemical is seriously hygroscopic, but should be stored in reasonably dry places.

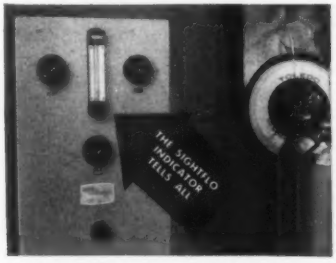
Dry chemical feeders must be equipped with dust prevention units so that the fluoride compound can be dumped into the hoppers without dust reaching the atmosphere. For solution feeders, dust prevention or control equipment may or may not be required by the Department, depending on local conditions. Operators should be provided with respirators, such as BM 2101 or BM 2133. Rubber gloves should be available, should not be used for any other purposes than handling fluoride compounds, and should be washed after each use.

The low solubility of sodium silicofluoride requires the use of large solution tanks because the strength of the solution will be below the 0.4% to 0.6% saturation value. When sodium fluoride is used, hard water will form calcium fluoride which will precipitate in the feeding equipment of solution feeders. This is especially significant when making a saturated solution, and in such cases a small zeolite softener may be used to soften the water.

Since very dilute solutions can be fed, the minimum size of chemical pumps and solution feeders is not usually important, even with very small supplies. In the case of dry feed units, the solution pots should be much larger—5 times or more—when sodium silicofluoride is being used. Slurries may be formed when the amount of water flowing through the solution pot is less than about 3 gals. per pound of sodium fluoride or 30 gals. per pound of sodium silicofluoride.

Scales must be available for weighing the chemical to be dissolved in the tanks of solution feeders.

Application to the water should be at a point where thorough and rapid mixing of the chemical is assured. A good place is where the water enters a reservoir or basin.



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Softening with lime at high pH values will precipitate some of the fluorine, so the fluoride should be added following the softening reaction. Coagulation, also, may remove some of the fluoride ion so treatment is best applied to the filtered water.

Past practice has been to add 1.0 to 1.2 ppm fluoride ion while never exceeding 1.5 ppm. Some attempts have been made to modify the dosage seasonally, reducing the concentration when the intake of water is likely to be greater. Where high summer temperatures prevail, this method may have some justification. At the present time, however, no such seasonal changes appear necessary in New York State and 1.0 ppm should be considered as the standard dose.

The test for the fluoride concentration is a color test which, because both intensity and tint of color may differ with different concentrations of fluoride ion, and also because the color fades, is somewhat more difficult to perform than is the case with other standard color tests. Some substances may cause interference, but the concentration of interfering materials required is greater than is normally encountered in potable waters. Field kits are available for routine control tests.

A City-College Sewage Treatment Plant

There has recently been completed at Ames, Ia., a sewage treatment plant involving several unusual features. The city has a population of 23,200 and Iowa State College is located there. The city and college had separate treatment plants, both obsolete. They agreed to build jointly a new plant to serve both, the initial and operating costs to be shared between them on the basis of the amount of sewage contributed—approximately 70% by the city and 30% by the college.

The plant cost about $1,000,000. As it discharges into a stream which, at times, contains little or no flow, complete treatment is then necessary; but at other times modification of the degree of treatment may be permissible. To determine when and how much of such modification can be permitted, a laboratory is located in the control house; and a U. S. Geological Survey stream gauging station will be maintained at the stream with a continuous recorder in the control house. The laboratory will be used by student classes also.

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Philadelphia Public Works

(*Continued from page 47*)

part of the project and the city has made $4,700,000 available toward its share of the cost. The Delaware Industrial Highway is another greatly needed improvement.

In addition to the recommended program of new construction, only a portion of which is covered in this summary, the opening of streets to serve new homes will constitute a considerable program. A large part of this work will be covered by assessments against abutting property. Also, rehabilitation of the older streets of the city is necessary. It has not yet been possible to catch up entirely with the work that accumulated during the depression and the war and to do the additional repaving and resurfacing that becomes necessary each year. However, excellent progress is being made. With the increase in efficiency resulting from new equipment already provided, it is estimated that $1,350,000 a year, plus funds available from other sources, will be sufficient.

A considerable number of bridges are to be constructed or reconstructed, including five bridges on Roosevelt Boulevard which, being narrower than the Boulevard, now constitute bottlenecks for traffic. Others included in the program will provide for better crossings of railroads or of major traffic arteries.

At the International Airport, the recommended and scheduled improvements will supplement the construction of the new terminal building and will add other facilities needed to make the airport fully adequate. These will include extension of utilities to the terminal area, paving of roadways and parking lots, new taxiways, lighting, apron paving and utilities, refueling facilities extensions, addition to the maintenance shop and equipment for all-weather operation.

Central-city traffic congestion is an urgent problem. An important step toward alleviating this problem was taken by the creation of a Parking Authority, which is to acquire sites and construct publicly-owned parking garages at strategic locations. These garages are to be operated by private interests under leases from the Authority, and construction will be financed by the proceeds of bonds issued by the Authority. The city has advanced $50,000 with the requirement that

this advance be repaid. A 10-man committee, consisting of representatives of interested public and private agencies has been appointed to advise the Authority.

Los Angeles

(*Continued from page 58*)

building. Gas for the domestic system serving water heaters, space heaters, laboratory burners, etc., is taken from the high pressure line, passed through gas purifiers to reduce the hydrogen sulfide content and delivered at 1.8-lbs. per sq. in. pressure through a 4-in. line to the administration building, headworks building, and service building.

Five of the nine 1,688 hp engines drive 4800-volt, 3 phase, 60 cycle, 1486 KVA generators which generate all the electric power needed to operate the plant. The other four engines are connected to 40,000 cu. ft. per min. blowers which supply all of the air used in the aeration and pre-aeration units.

Any surplus gas that is left after the needs of the engines and the domestic system are met is burned in flash-type dryers used to de-water sludge cake. The drying furnaces are equipped to burn natural gas and fuel oil as well as digester gas and it is necessary to purchase additional fuel when the plant is in full operation. The ability of these dryers to use several types of fuel is the principal reason why the capacity of the gas storage facilities is so small in relation to the large daily production.

When the sludge dryers are not in operation, excess gas flows to 12 waste gas burners which are lighted automatically in sequence as the low pressure holder approaches the full position.

The Hyperion treatment plant was designed in the Bureau of Engineering of the Department of Public Works under the direction of Lloyd Aldrich, City Engineer, with Metcalf & Eddy of Boston as Consulting Sanitary Engineers. Merrill Butler was Deputy Engineer in direct charge of the design; E. G. Studley, Engineer of Sewer Design; C. L. Bell, Projects Coordinating Engineer; G. A. Parkes, Senior Treatment Plant Design Engineer; and F. M. Darnell, Senior Administrative Engineer. The plant is being operated by the Bureau of Engineering. Foreman R. F. Mooney erected the Hortonsphere for Chicago Bridge and Iron Works, who furnished the above data.

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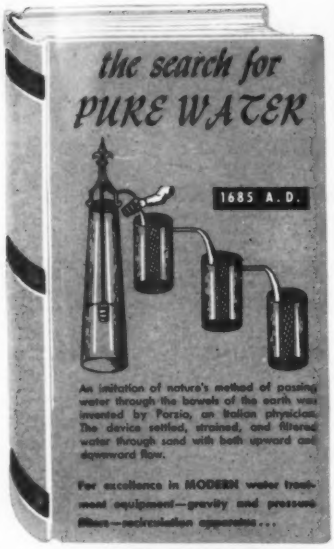
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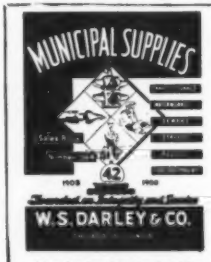

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PUBLIC WORKS EQUIPMENT News

Reversible Trip Blade Snow Plow

Three models of a reversible trip blade sno-plow have been announced by Frink for 1½, 2 to 4 and

Four snow plowing angles.

5 to 10-ton trucks. This plow differs radically from previous models. By means of a semi-circle four different right or left plowing angles are available, in addition to the 0° for bulldozing. A trip mechanism maintains a constant pressure, preventing chattering at the cutting edge. This new blade is interchangeable with Frink V and One-Way blade plows using the same truck attachments. Illustrated bulletin 51FA will be sent on request by using the coupon.

Use coupon on page 26; circle No. 8-1

Turbidimeter Aids in Water Treatment

Providing continuous and automatic measurement of suspended matter in the pre-treated, partially settled influent of the East St. Louis & Interurban Water Co. plant, a GE turbidimeter aids materially in economical treatment, permitting closer control over the treatment process and the application of coagulating chemicals. This turbidimeter operates on the principle that turbidity of a liquid varies in direct proportion to the ratio of scattered light transmitted through the liquid. It operates on a 115-volt circuit and has a power consump-

Continuous turbidity reading.

tion of about 150 watts. The scale can be set to read any desired range of turbidity. According to O. H. Brown, plant chemist, the permanently recorded continuous readings are an important advantage. More information by using the coupon.

Use coupon on page 26; circle No. 8-2

Centrifugal Pumps, 1½-in. to 6-in.

These new Rex centrifugals are made in sizes from 1½-inch, 4,000 gpm, to 6-inch, 90,000 gpm. They are guaranteed to meet the standards of the Contractors Pump Bureau of the AGC. Like our newer automobiles, these pumps are designed for easy servicing and replacement of worn parts. Bulletin 51-27 describes these pumps, with

The following table gives capacity in gallons per minute:

CAPACITY IN	TOTAL HEAD INCLUDING FRICTION	Height of Pump Above Water 10 Ft.	15 Ft.	20 Ft.	25 Ft.
	15 ft.	67			
	20 ft.	66	59		
	25 ft.	65	58	47	
	30 ft.	63	56	47	33
	40 ft.	54	49	44	32
	50 ft.	37	35	34	29
	55 ft.	25	25	25	25

Centrifugal pump table.

extensive data on their operation, giving for each pump the kind of information shown herewith for the 1½-in. 4M pump. If you want this catalog, use the coupon.

Use coupon on page 26; circle No. 8-3

Protect Your Pipe Line Against Rocks

A new use has been found for Fiberglas. It is used as a pipe shield in rough terrain or wherever pipe

Fiberglas pipe protection.

may have to stand rough handling. It is a prefabricated cushioning material of high impact strength which is applied by a 2-man crew with pressure-sensitive tape or metal strap. It won't sag, stretch, shrink or disintegrate, crack or strip under tension or react negatively to temperature changes. More information on your problems by using the coupon.

Use coupon on page 26; circle No. 8-4

Designing and Installing Cathodic Protection

Complete engineering, design and installation of cathodic protection devices for underground pipe lines, water storage tanks, flocculators and clarifiers are now furnished by Harco Corp. These installations utilize specially designed oil-immersed selenium rectifiers and ground anodes as well as backfill materials made particularly for the job, and take account of the many factors, such as soil and water characteristics, DO, temperature, coatings, stray currents and dissimilar metals. For more information, use the coupon.

Use coupon on page 26; circle No. 8-5

Centers without a template.

Fast Drilling in Hard Masonry

The Cyclo-core drill bit gives precision drilling in concrete, glazed tile or other hard masonry material, using a rotary drill, for holes up to ¾ inch in diameter. The removable center does away with the necessity of using a wood template to start a hole in the exact place desired. As soon as the hole is spotted, the center is removed. A chart "The right drill bit for each job" helps and is available by using the coupon.

Use coupon on page 26; circle No. 8-6

Makes Pipe Laying and Material Handling Easier

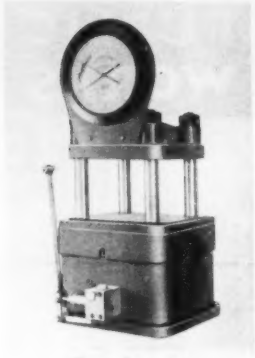
Users of the Schield Bantam shovel crane, 5-ton, truck-mounted, can now get a heavy-duty boom designed especially for lifting and loading. The boom is available in 25-ft. lengths, with 5-ft. extensions, and it is said to have four times the rigidity of the standard boom. Rating is 10,000 pounds at 10 ft., with outriggers and 1,000-lb. counterweight. More dope by using the coupon.

Use coupon on page 26; circle No. 8-7

The Smoke Goes Up the Chimney—but Filtered

Soot collecting bags of Du Pont's new Orlon acrylic fiber will greatly reduce the soot and dust passing out of chimneys, ending much or all air contamination. They may also save enough loss of valuable material for the manufacturer to more than pay for costs of installing and operating. These bags are durable and are resistant to mineral acids, weak alkalies and common solvents. Full information by using the coupon.

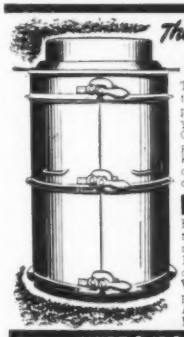
Use coupon on page 26; circle No. 8-8



Tests Concrete

Concrete Compression Tester You Can Use on the Job

This tester permits the manufacturer or user of any concrete products, whether pipe or blocks, to run daily compression tests in the plant or on the job in the field. It is a hydraulic press made by Forney and will exert a ram pressure of 175 tons. Especially valuable is the direct reading pressure gage, which eliminates the possibility of error in using conversion tables. It applies



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For making pipe by hand methods by either the wet or semi-dry processes. Built to give more years of service—sizes for pipe from 10" up to 120" and larger—tongue and groove or bell and pipe at lowest cost. **WRITE TODAY.** Complete information, prices, and estimates sent on request. Also manufacturers QUINN CONCRETE PIPE MACHINES.

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pressure in accordance with ASTM specifications. Full data by using the coupon.

Use coupon on page 26; circle No. 8-9

Handie-Talkie Portables

A new version of the Motorola "handie-talkie" portable FM radiophone incorporates an adjustable squelch which reduces the annoyance of tube and circuit noises normally encountered in an FM receiver in the absence of a signal. The normal operating range of no-squelch is up to 25 to 50 db noise reduction. Audio distortion resulting from use in fringe areas is eliminated. These portables are available with either wet or dry cell power supplies for operation in either 25-50 or 152-174 megacycle bands. For more data, use the coupon.

Handie-Talkie

Use coupon on page 26; circle No. 8-10

Easily Portable Earth Auger and Saw

With this gasoline engine driven tool you can drill holes for retaining wall supports, guard rail posts, fence posts and any kind of poles. It carries augers 6, 9 or 12 inches by 30 ins. And if you get tired of

Saws and/or digs.

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digging holes, you can take off the auger and put on a chain saw with 18 to 84-in. cutting capacities. You can cut down post or pole timber, cut it to size and put it into the ground. Full data by using the coupon.

Use coupon on page 26; circle No. 8-11

Changes Truck and Heavy Equipment Tires

Designed to remove heavy tires from equipment of all sorts, this hydraulic tire changer will speed up work and greatly reduce labor requirements. It is said that tires have been removed that have been in place on the rims for as much as seven years. Since the equipment is hand operated, it can be used in the field as well as in the shop. Full information from Dixie Tallyho, Inc., Fairburn, Ga., or by using the coupon.

Easier to change big tires.

Use coupon on page 26; circle No. 8-12

PERSONAL NEWS

H. M. Bosch, who will return to this country this fall from service with the WHO in Switzerland, has been appointed Prof. of Public Health Engineering, University of Minnesota, succeeding Harold Whittaker.

John S. Telfair, Jr., formerly with the Engineer Department, U. S. Army, and the Florida State Board of Health, has joined Smith & Gillespie, consulting engineers of Jacksonville, Fla.

Clarence W. Klassen, Chief Sanitary Engineer of the Illinois Department of Health, has been elected chairman of the Ohio River Valley Water Sanitation Commission.

ASSOCIATIONS

The North Carolina Sewage Works Ass'n. will sponsor the 1951 Sewage and Industrial Wastes Short School which will be held Sept. 10 to 14 at the University of North Carolina, Chapel Hill, N. C., providing levels of instruction for small plants, and for intermediate and advanced students.

The South Dakota Water & Sewage Works Conference will hold its 17th annual meeting at Yankton, S. D., Sept. 19-21, at the Charles Gurney Hotel. Information from Charles C. Carl, Dir., Div. of San. Engrg., Pierre, S. D.

The Oklahoma Water, Sewage & Industrial Wastes Short Course will hold its 25th annual meeting Dec. 3 to 7 at Oklahoma A & M College, Stillwater, Okla. Information from Foster S. Burba, at A & M.

The fifth annual conference of the County Engineers of Iowa will be held at Memorial Union, Iowa State College, Ames, Dec. 5 to 7. More information is available from Prof. L. O. Stewart of the Civil Engineering Department.

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A NEW Method for
PSYCHODA FLY CONTROL

TESTS at the Village of Ridgewood, N. J. and City of Worcester, Mass. filter beds indicate that the residual properties of CHEM-LARV suppresses the numerical growth of psychoda flies beyond the ability of other agents tried.

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Plan your Air Raid warning system now! Remember these Basic Facts.

- ***Horsepower is no true measure of sound output.***
- ***Decibel output is no true measure of effective sound distribution.***

A successful air raid system is not that which has the most powerful warning device nor yet the one which produces the greatest decibel output at 100 feet or other specific distance.

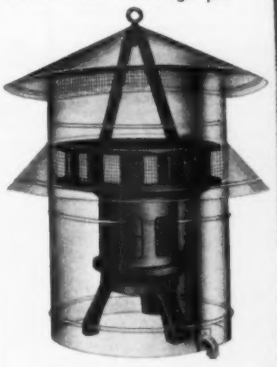
• *The effective air raid system is one which blankets every area completely with ample and unmistakable penetrating sound waves.*

Centrally located large signals simply cannot do this because buildings, trees, hills, and other obstacles block off, deflect, or reflect the sound waves. Wind, humidity, altitude and temperature all conspire to alter the distribution of sound.

"Super" signals may produce 100 times the volume of a small signal. By simple arithmetic it should cover 100 times the area. The truth is that sound distribution functions by higher mathematics, not arithmetic. Simple arithmetic doesn't take into consideration the obstacles to sound travel encountered in congested municipalities where air raid sirens are needed and used.

The more congested the area, the more signal devices required to blanket it, regardless of size. *Ponderous, oversize devices cost infinitely more for blanket coverage per square mile than smaller signals.* In extremely congested areas, it takes almost as many "whooper-doopers" to assure blanket coverage as it would smaller sirens.

Dollar for dollar, 2, 5 or 7½ horsepower sirens will do the job better and more dependably. Cities which used the giant models in World War II have turned to smaller sirens in this emergency. Philadelphia, Newark, New Orleans, Hartford, Providence, El Paso, and Buffalo have had or are now installing the finest air raid systems. Draw on their wisdom and experience. We will be glad to give you honest and sincere assistance with your air raid signal problem. Write us and ask for bulletin #95.



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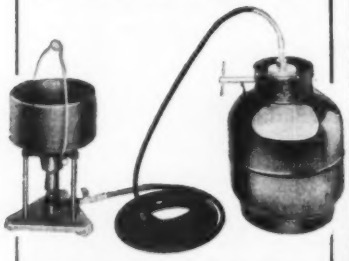

FOR WATER WORKS CONSTRUCTION

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The Insto-Gas floor-type furnace has all the Insto-Gas features — instant lighting, safety and economy.

This furnace has a melting speed of 40 lbs. of lead in six minutes. It can be used for melting metal, jointing compounds and asphalt.

With a 50 ft. hose, the furnace can be moved right to the work without moving the cylinder. The flame control valve is located at the furnace.

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Water Works maintenance departments also use Insto-Gas torches for soldering, sweating copper pipe fittings, preheating and thawing.

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WORTH TELLING . . .

by Arthur K. Akers

★ **James P. Stewart** has been elected president of **DeLaval Steam Turbine Company**, Trenton, N. J. **Wencel A. Neumann Jr.** succeeds Mr. Stewart as executive vice president of industrial sales.

Mr. Stewart

Mr. Neumann

★ **Infilco Inc.**, takes another forward step at Tucson, Arizona, with announcement of its new $400,000 headquarters office building, complete with air conditioning within and palm trees without.

★ And, speaking of air conditioning, we dropped in on old-friend **Stanley Bobbitt** at the **Alabama Pipe Company** in Anniston, Ala., for our first sight of one of the finest and most modern office buildings on our route. That's "Pipe Progress" for you, if we may twist a title.

★ **Lloyd Fox** is the new commodity manager, wholesaler sales, for **Wolverine Tube Division** (copper tubing) at Detroit.

★ Below is something new: radio equipment being built by **General Electric** for installation in a trailer to be used by Civil Defense officials as the hub of an emergency communications system in Onondaga county, N. Y. **Neal F. Harmon**, (left) G.-E. civil defense coordinator at Syracuse, explains it to the county Civil Defense director, **Harvey S. Smith.**

★ **Caterpillar Tractor Company** has been awarded a $22,000,000 order by the U. S. Army Corps of Engineers for its larger model of track-type tractors.

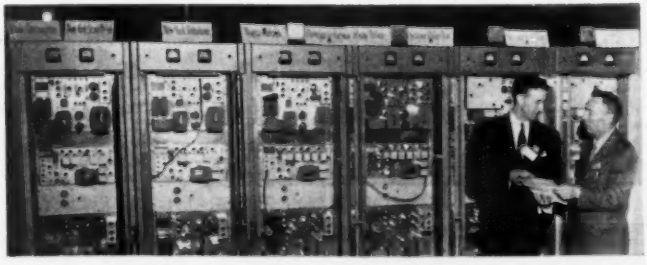
★ **W. K. Perkins**, manager of sales for the motor truck diivsion of **International Harvester Company**, announces a nation-wide program for the conservation of materials and man-power, to mobilize highway transport at peak efficiency.

Mr. Musser

★ **Glenn W. Musser** is now firmly established as sales representative in the three principal southwestern states for **The Ludlow Valve Manufacturing Company** of Troy, N. Y., headquartering at 2415 San Jacinto, Houston 4.

★ **John McKechnie** has been made general sales manager of **The Murdock Manufacturing and Supply Company**, Cincinnati, outdoor drinking fountains etc.

★ **Sterling Engine Company**, of Buffalo, is back in the news with election of **Kenneth S. Thomson**, of Cleveland, to its presidency.



GE radio equipment for mobile communication center.

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The Choice of Five Capitals

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Five capital cities under five different flags, but with one important factor in common . . . they all have major water supply lines built of Lock Joint Concrete Pressure Pipe.

* * *

This unanimity of choice can be attributed to the sound design, high quality of materials and excellent workmanship which goes into the production of Lock Joint Concrete Pressure Pipe. The ample steel reinforcing provides a rugged pipe which will withstand both high internal pressures and unusually heavy overburdens. Walls of carefully proportioned concrete prevent corrosion or tuberculation assuring durability and permanently high carrying capacity. Flexible expansion joints at every joint provide easy installation and assure permanent water tightness under all conditions of service.

* * *

The test of time has proven Lock Joint Concrete Pressure Pipe lines to be extremely economical to operate, requiring practically no maintenance or repairs throughout an estimated useful life of more than 100 years. Yet the pipe is amazingly low in initial cost.

* * *

For your next water transmission line involving pipe 16" in diameter or larger, specify Lock Joint, the capital pipe chosen by capital cities because of its durability, dependability and economy.

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CARACAS • VENEZUELA

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SCOPE OF SERVICES—Lock Joint Pipe Company specializes in the manufacture and installation of Reinforced Concrete Pressure Pipe for Water Supply Distribution Mains in a wide range of diameters as well as Concrete Pipes of all types for Sanitary Sewers, Storm Drains, Culverts and Subaqueous Lines.

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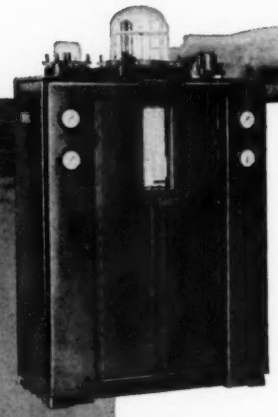
PRESSURE PIPE

There's more than meets the eye...



Wallace & Tiernan
Visible Vacuum Chlorinator

IN W&T CHLORINATORS, TOO

Technical assistance, service, basic research — these are some of the important unseen things back of a W&T Chlorinator. For example, take readily available service. It's mighty comforting to a waterworks operator to know that back of the equipment which guards the public health in his community there is always on call a man who's a specialist in chlorinator maintenance — a man who's personally interested in the welfare of the installations in his territory — a man who's an expert in equipment selection, installation, maintenance service and the technical aspects of chlorination. That's what W&T's Nationwide Field Staff means — perhaps one reason so many plants are equipped with W&T Chlorinators.

W&T Field Engineers Are Conveniently Located To Give Prompt Service.

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